(पूर्व प्रकाशित कहानी का संशोधित रूप)

यह पुस्तक राज्य संदर्भ केंद्र दिल्ली, यूनिसेफ एवं नेशनल बुक ट्रस्ट, इंडिया के संयुक्त तत्वावधान में आयोजित कार्यशिविर में तैयार की गयी थी।

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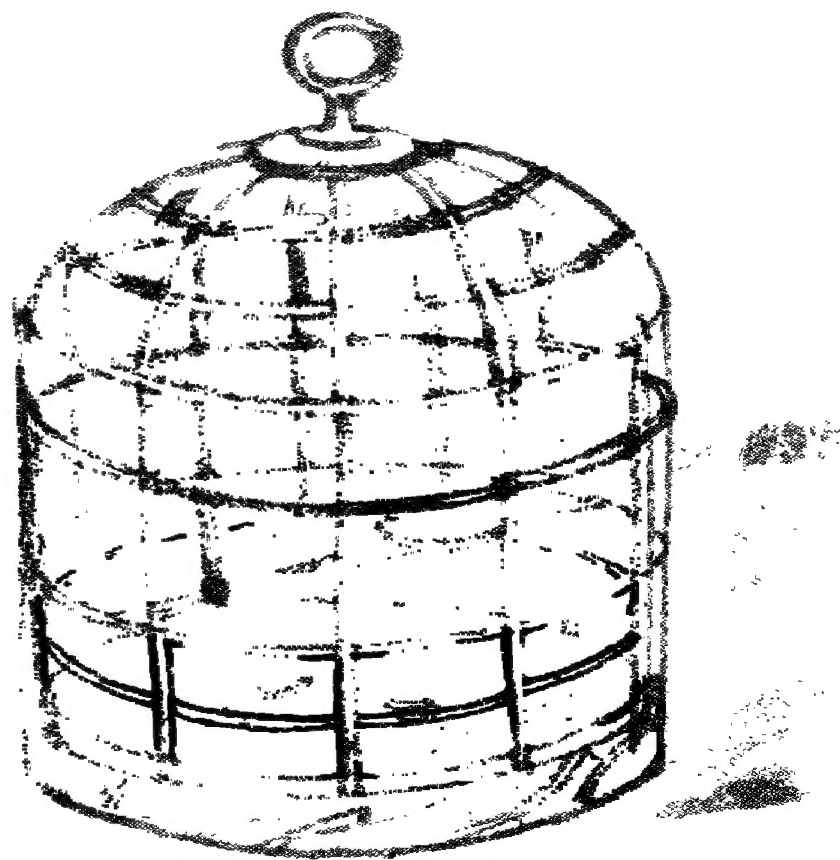
निदेशक, नेशनल बुक ट्रस्ट, इंडिया, ए-5 ग्रीन पार्क
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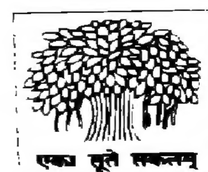
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नेशनल बुक ट्रस्ट, इंडिया


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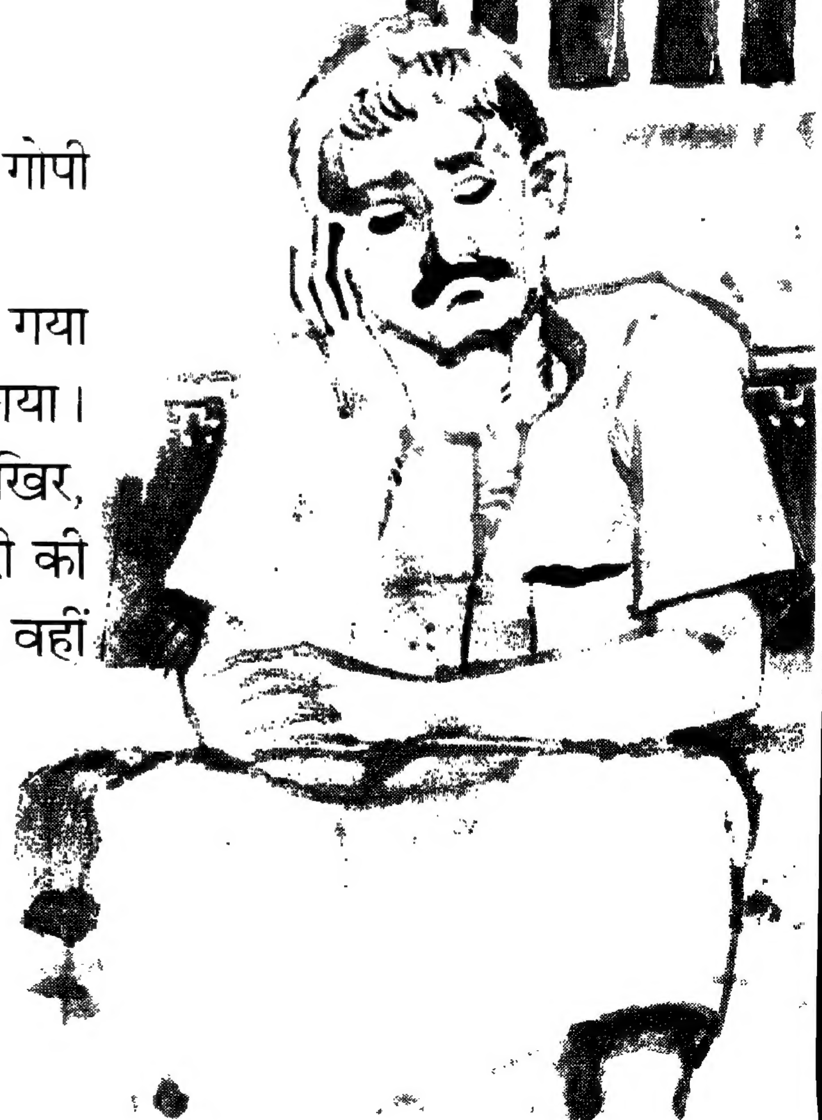
एक बार मैंने एक तोता पाला था। मगर एक दिन न जाने कैसे, पिंजरे का दरवाज़ा खुला रह गया। एक काली बिल्ली आई और तोते को मुंह में लेकर भाग गई। मैं तो बेबस-सा खड़ा देखता रह गया था।

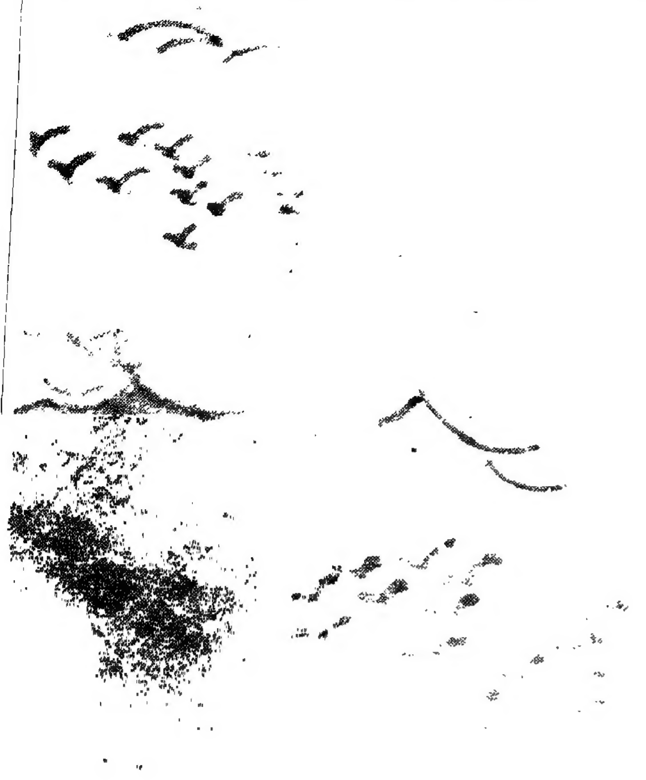
इस घटना से मैं बड़ा दुखी हुआ। अफसोस इस बात का था कि हम लोगों की चूक से ही तोते की जान गई थी। अभी कुछ ही दिन तो हुए थे, यह तोता हमने पाला था। देखते ही देखते वह सबसे हिल-मिल गया था। बड़ी मीठी-मीठी बातें करता था। मेरे छोटे भाई गोपी ने तो उसे कई दोहे याद करवा दिए थे। फिर यह दोहा तो वह बड़े मज़े से बोलता था—

चटपट पैंची, चतुर सुजान।
सबके दाता श्री भगवान।।

तोता जब यह दोहा बोलता तो मेरा छोटा भाई गोपी लोट-पोट हो जाता।

तोते के चले जाने से सारा घर ही उदास हो गया था। उस दिन न मैंने, और न ही गोपी ने खाना खाया। सूने पिंजरे को देखकर मेरा मन रो उठता था। आखिर, मुझसे यह सब देखा नहीं गया। मैंने पिंजरे को बेरी की डाल से उतारा और एक कोने में डाल दिया। फिर वहीं





खड़े-खड़े मैंने यह तय किया: तोता तो क्या, अब कभी कोई जीव-जंतु भी नहीं पालूंगा।

हमारे घर के आंगन के ऊपर से ही रोज़ तोते उड़ कर जाते थे। सांझ होते ही तोतों के झुंड आते और बोलते हुए निकल जाते। शाम होते ही मैं आंगन में खाट डाल कर लेट जाता और तोतों को उड़कर जाते हुए देखता रहता। पहले दूर से उनकी धीमी, मीठी आवाज़ सुनाई पड़ती। फिर ढेर सारे तोते उड़ते हुए आते और निकल जाते। पलक झपकने की देर में आकाश खाली हो जाता। लेकिन थोड़ी ही देर बाद एक और झुंड उड़ता हुआ निकल जाता। इन्हें देख-देखकर मुझे तोते की याद सताती और मैं उदास हो जाता।

असल में सांझ होते-होते तोतों की वापसी शुरू होती थी। झुटपुटा होने से पहले वे अपने-अपने घोसलों में लौट जाते थे। गांव के बाहर एक नदी थी। उसके किनारे बड़े-बड़े बट, पीपल और सेमल के पेड़ थे। उन्हीं पर तोतों ने अपने घर बना रखे थे। वहीं पर ये रैन-बसेरा करते थे। मैंने एक खास बात देखी थी।



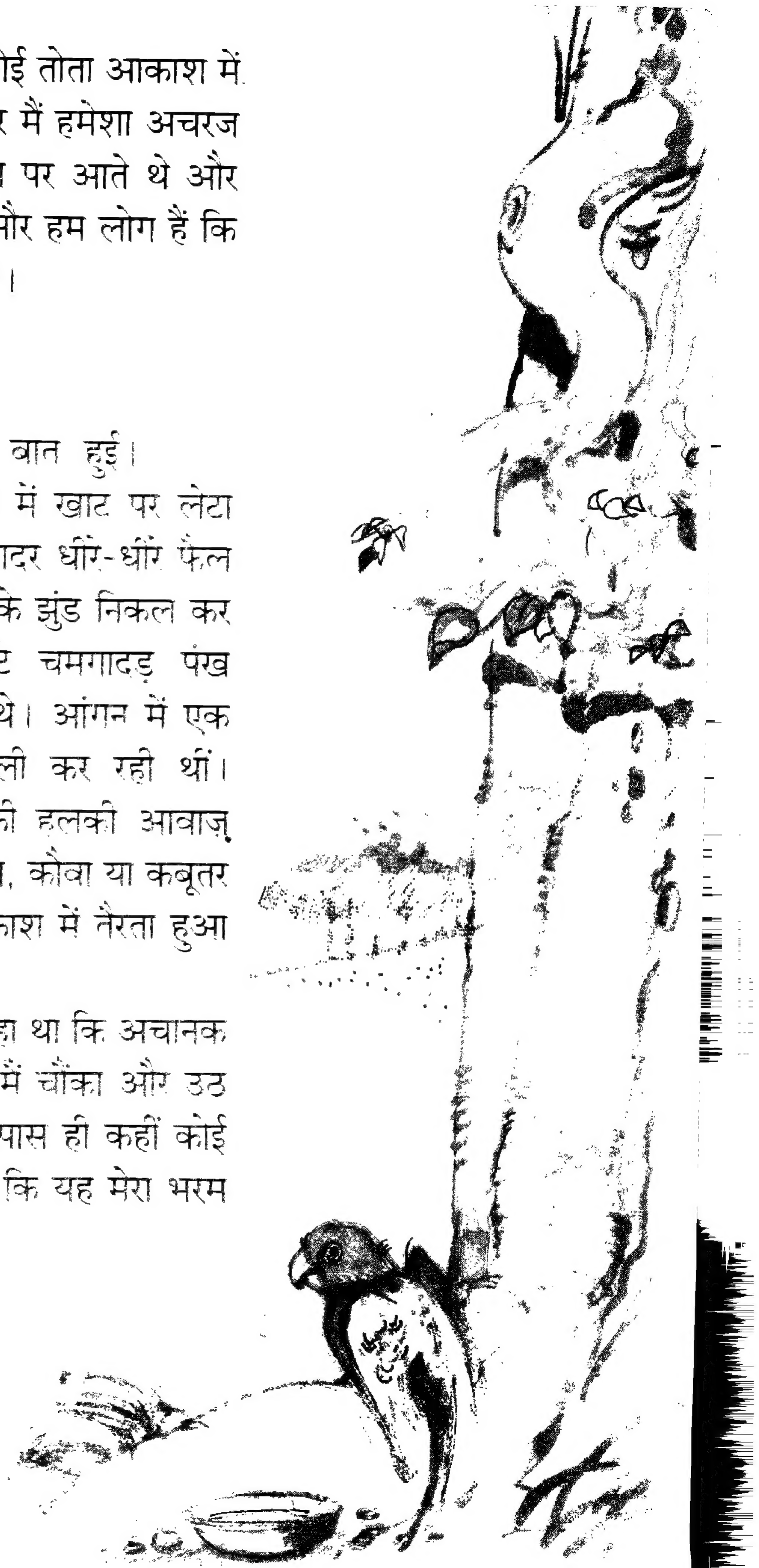
वह यह कि अंधेरा घिरने के बाद कोई तोता आकाश में दिखाई नहीं पड़ता था। यह देखकर मैं हमेशा अचरज किया करता। तोते नियम से समय पर आते थे और समय पर घरों को लौट जाते थे। और हम लोग हैं कि कोई काम समय पर नहीं करते।

2

अब एक दिन बड़ी अजीब बात हुई।

सांझ की बेला थी। मैं आंगन में खाट पर लेटा सुस्ता रहा था। अंधेरे की काली चादर धीरे-धीरे फैल रही थी। थोड़ी ही देर पहले तोतों के झुंड निकल कर जा चुके थे। हवा में छोटे-छोटे चमगादड़ पंख फड़फड़ा कर उड़ते दिखाई पड़ते थे। आंगन में एक तरफ भैंस और गाय बैठी जुगाली कर रही थीं। बीच-बीच में उनकी गलघंटियों की हलकी आवाज़ सुनाई पड़ जाती। या फिर कोई चील, कौवा या कबूतर काली छाया की तरह चुपचाप आकाश में तैरता हुआ निकल जाता।

मैं लेटा-लेटा यह सब देख ही रहा था कि अचानक एक तोते की आवाज़ सुनाई पड़ी। मैं चौंका और उठ कर बैठ गया। मुझे लगा कि आसपास ही कहीं कोई तोता बोला है। पहले तो मैं समझा कि यह मेरा भरम है।



मुझे तोतों को देखते हुए इतने दिन हो गए थे। मगर अंधेरा घिरने के बाद मैंने आकाश में तोतों की आवाज़ कभी नहीं सुनी थी। मैं चकित-सा बैठा देख ही रहा था कि एक बार फिर तोते की आवाज़ मेरे कानों में पड़ी।

मैं चौकन्ना होकर देखने लगा। तभी क्या देखता हूं कि एक तोता ऊपर से निकलकर जा रहा है। मगर आगे जाकर वह जल्दी ही लौट आया। थोड़ी देर आंगन पर मंडराया और फिर बेरी पर जाकर बैठ गया। बैठते ही वह दो-तीन बार बोला। एक बार उसने पंख भी फड़फड़ाए। फिर एकदम सन्नाटा छा गया। हवा जैसे एकदम थम गई थी। पत्ता तक नहीं हिल रहा था।

मैं आंखें फाड़े बेरी की तरफ देख रहा था। फिर अचानक यह बात मेरे मन में आई। हो-न-हो, कोई तोता अपने झुंड से बिछुड़ कर भटक गया है या थक कर हमारी बेरी पर आ बैठा है।

तब तक घना अंधेरा घिर आया था। अब तोते की भी आवाज़ सुनाई नहीं पड़ रही थी। इसलिए मैं चुपचाप उठा और भीतर गया। पता नहीं क्यों, मुझे भरोसा था कि बेरी पर बैठा तोता रात यहीं बिताएगा। इसलिए मैं उसके खाने के लिए थोड़ी-सी रोटी ले आया। ऊपर बेरी की तरफ देखते हुए मैंने रोटी के टुकड़े पेड़ के तने के साथ बिखेर दिए। एक कसोरा पानी का भर कर भी साथ रख दिया।

यह सब करके मैं भीतर गया और अपने बिस्तर पर लेट गया।

लेकिन मेरी आंखों में नींद नहीं थी। रह-रह कर एक सुंदर तोते की छवि मेरी आंखों के आगे नाच उठती। इसके साथ ही मुझे अपने उस तोते की भी याद हो आई जिसे काली बिल्ली उठा कर ले गई थी। इस घटना को इतने बरस बीत चुके थे। मगर उस वक्त भी मैं अपने तोते को बिल्ली के जबड़े में फंसा देख रहा था।

इसी सोच-विचार में पता नहीं कब मेरी आंख लग गई।

3

सुबह हुई, तो मैं सबसे पहले आंगन में गया। यह देखकर मैं चकित और खुश भी हुआ कि तोता बेरी के नीचे बैठा था। मैं रात को जो रोटी वहां डाल गया था, उसे वह मज़े से खा रहा था। बीच-बीच में वह कसोरे में से पानी पी लेता। मैं जैसे मुग्ध-सा खड़ा तोते को देख रहा था। यह तोता कितना सुंदर है! कैसा चमकीला हरा रंग है! चोंच भी कैसी लाल-लाल है! और इसकी कंठी तो देखो—गुलाबी भी है और लाल भी!

"हाय, इतना सुंदर तोता!" एकाएक मेरे मुंह से यह बात निकली। फिर अपना प्रण भूल कर मैं ललचाई आंखों से तोते को देखने लगा। मैं सोच रहा था, "क्यों न इस तोते को पाल लूं।"

बस, यह बात मन में आते ही मैंने एक कपड़ा लिया और दबे पांव तोते की तरफ बढ़ा। तोता था कि चैन से बैठा रोटी कुतर रहा था। बिल्कुल नहीं जानता था कि उसके सिर पर कैसी बिपदा खड़ी है। मगर ज्योंही मैं निकट गया कि वह चौंक कर मेरी तरफ देखने लगा। फिर टांय-टांय भी करने लगा। एक बार उसने उड़ने की भी कोशिश की। मगर धरती से चार-पांच हाथ ऊपर उठ कर वह नीचे बैठ गया। फिर चलते हुए पेड़ के तने के साथ जा चिपका।

यह बात मेरी समझ में नहीं आई। लगता था जैसे तोता उड़ ही नहीं पा रहा था। यह तो बड़ी हैरानी की बात थी। रात को मैंने इसे उड़ कर आते हुए देखा था। रात-रात में ही इसे क्या हो गया?

बस, मैंने चील की तरह झपट्टा मारा और तोते को पकड़ लिया। इस पर वह कपड़े के भीतर टांय-टांय करके चीखने लगा। मैंने हाथ डाल कर उसे पकड़ा, तो वह और ज़ोर से चीखा। उसकी आवाज़ ऐसी थी कि मेरा तो दिल ही दहल गया। एक बार तो मुझे लगा कि मेरा पहला पालतू तोता बिल्ली के चंगुल में छटपटा रहा है।

फिर थोड़ी ही देर में वह शांत हो गया। मगर जब मैंने उसके पंखों को सहलाना चाहा, तो वह एकदम छटपटा उठा। तब मुझे पता चला कि उसके पंख पर चोट लगी थी।

अब सारी बात मेरी समझ में आई कि रात को वह लौट कर क्यों बेरी पर आ बैठा था। हो न हो, किसी ने इस पर हमला किया होगा। या कोई और बात हुई होगी। नहीं तो इस तरह अंधेरे में यह अकेला न उड़ता फिरता!

लेकिन यह सोच कर मुझे अच्छा लगा कि रात को मैंने तोते के लिए रोटी-पानी रख दिया था।

मगर तोता रह-रह कर मेरे हाथों में कांप उठता था। इस पर मैंने तोते को पुचकारते हुए कहा, ''मियां मिट्ठू! तू डर मत। मैं तुझे बड़े प्यार से रखूंगा।



मेरे पास बहुत बढ़िया पिंजरा है। रोज़ तुझे हरी-हरी मिर्च खिलाऊंगा। सुबह-शाम चने और रोटी खिलाऊंगा। हो सका, तो अनार भी खिलाऊंगा। तुझे अच्छी-अच्छी बातें सिखाऊंगा। और फिर एक-एक बिल्ली को खदेड़ कर गांव से बाहर कर दूंगा...''

मगर इस तरह मैं तोते पर कोई दया नहीं कर रहा था। असल में मैं अपनी ही बात सोच रहा था। मैं एक बार फिर तोता पालना चाहता था—हालांकि मैंने कभी ऐसा न करने का प्रण किया था।

बस, मैंने वही किया जो मुझे करना चाहिए था। आंगन में रखे पिंजरे का रंग धूप, पानी और हवा से खराब हो गया था। उसे झाड़-पोंछ कर मैंने उसे बेरी की डाल से लटकाया और तोते को उसमें बंद कर दिया। पिंजरे में पड़ते ही तोते ने तो जैसे सारा घर सिर पर उठा लिया।

मगर मैं खुश था। थोड़ी देर में मेरा छोटा भाई गोपी आया, तो इतना सुंदर तोता देखकर खुश हो गया। उसे यह तोता भा गया था। इसलिए पिंजरे की तरफ टकटकी लगाकर देखते हुए बोला, ''भैया! इतना सुंदर तोता कहां से लाए!''

मैंने उसे डपट दिया, ''इस तरह आंख भर कर तोते को नहीं देखते। नज़र लग जाती है। चल, जाकर अपना काम देख।''

इस पर गोपी मेरी खिल्ली उड़ाते हुए बोला,



"भैया! इतने बड़े होकर भी वहम करते हो!"

तोता अब भी शोर मचा रहा था। शायद समझ गया था कि अब इस कैद से छुटकारा नहीं मिलेगा। मगर वह जितना चिल्लाता, उतना ही मैं खुश होता। पिंजरे की सलाखें पकड़ कर मैंने कहा, "मियां मिट्ठू! शोर मचाने का अब कोई फायदा नहीं। तू खुश हो कि मैंने तुझे मरने से बचा लिया। अगर रात को कोई बिल्ली इधर आ जाती, तो मुझे जीवित न छोड़ती। अब चुपचाप बैठ। तूने अच्छे काम किए थे कि तू हमारे आंगन में उतरा। नहीं तो जान से हाथ धो बैठता। अच्छा, तुम्हारे लिए हरी मिर्च लेकर आता हूं।"

घर से मैं एक-दो हरी मिर्चें ले आया। पिंजरे में मिर्च रख कर मैंने पानी वाली कटोरी में पानी भी भर दिया। मगर तोते ने आंख उठा कर भी इन चीज़ों की तरफ नहीं देखा। जैसे यह जतलाना चाहता हो कि कैद में सोने की चीज़ें भी मिलें तो मैं उन्हें हाथ भी नहीं लगाऊंगा।

मैंने कहा, "मियां मिट्ठू, खाएगा नहीं तो जिएगा कैसे? मिर्च खा और बोल-राम-राम!"

लेकिन तोता जैसे बुत बन बैठा था। मैंने मान-मनुहार करते हुए कहा, "गंगाराम! मेरे साथ बोल—

"चटपट पैंची, चतुर सुजान।
सबके दाता श्री भगवान॥"

मगर तोता तो उस लड़की की तरह मन मारे बैठा था जो पहली बार ससुराल आई हो। मैंने उसे बहुतेरा पुचकारा। दिलासा दिया। मगर तोते ने आंख उठा कर न तो मेरी तरफ देखा, न मिर्चों और पानी की तरफ। हां, बीच-बीच में वह आकाश की तरफ मुंह उठा कर बोलने ज़रूर लगता था। जैसे किसी की राह देख रहा हो। मानो कोई आएगा और उसे ले जाएगा।

उसकी यह हालत देख कर मैं थोड़ा उदास हो गया। मगर मैंने

सोचा—अभी नया-नया ही तो आया है! जल्दी ही हिल-मिल जाएगा।

मगर दिन ढलने के साथ ही तोते की बेचैनी बढ़ने लगी। पिंजरे की सलाखों को चोंच में भर कर उलझ रहा था। कभी ऊपर देख कर बोलने लगता। कभी चोंच में सलाख पकड़ कर कलाबाज़ी खाता। कभी पंख फड़फड़ाता। यह सब देखकर मुझे तोते पर दया भी आती और खुशी भी होती।

4

देखते ही देखते सांझ घिर आई। यह समय था तोतों के लौटने का। मैं डेवढ़ी में खड़ा देख रहा था। तभी तोतों का एक झुंड शोर मचाता हुआ आया और आंगन की बेरी पर उतर पड़ा। सारे आंगन में चिल्ल-पों मच गई। उन तोतों के साथ पिंजरे में कैद तोता भी बोलने लगा। फिर वह सलाखों को चोंच में पकड़ कर जैसे जूझने लगा।

यह देख कर मैंने कहा, "सुग्गे राजा! ऐसा मत कर। इतना ज़ोर मत लगा। कहीं ऐसा न हो कि तेरी चोंच चटक जाए। यह पिंजरा करीमा लुहार ने ठोंक-पीट कर तैयार किया है। इतनी-सी तो जान है तेरी! बेकार लोहे की सलाखों से उलझ रहा है!"

फिर न जाने मुझे क्या सूझी कि मैं हंसता-खिलखिलाता हुआ गया और पिंजरा उतार कर डेवढ़ी की तरफ बढ़ा। यह देखते ही सारे तोते मेरे सिर पर मंडराने और शोर मचाने लगे।

मुझे लगा कि एकदम मैंने पिंजरा नीचे रख नहीं दिया, तो तोते मुझे नोच डालेंगे। कहीं आंख ही फोड़ दें। कान ही कुतर खाएं। बस, इस बात से मैं इतना डरा कि मैंने पिंजरा वहीं छोड़ा और दौड़कर डेवढ़ी में घुस गया। वहां हांफते हुए मैं बाहर देख रहा था। ढेर सारे तोते पिंजरे पर बैठ कर सलाखों से जूझ रहे थे। लगता था जैसे पिंजरा तोड़ कर वे अपने तोते को छुड़ा कर ले जाएंगे।



इतना मज़ेदार खेल मैंने पहले कभी नहीं देखा था। फिर न जाने क्या सोच कर मैंने तोतों को जैसे चिढ़ाने के लिए कहा, "अरे, मूर्खों! कभी चोचों से भी पिंजरे टूटे हैं?"

खूब घना अंधेरा घिर आया था। आखिर, तोते थक-हार गए तो टांय-टांय करते हुए उड़े और देखते ही देखते आंखों से ओझल हो गए। कुछ देर तक दूर कहीं उनकी आवाज़ सुनाई पड़ती रही। फिर वह भी गायब हो गई। पिंजरे वाला तोता भी जैसे निराश होकर बैठ गया था।

इस पर मैंने भी चैन की सांस ली। सब तोतों ने कितना शोर मचाया था! तौबा-तौबा!!

देर हो चुकी थी। इसलिए आंगन में से पिंजरा उठाकर मैंने डेवढ़ी की छत की कड़ी से लटकती रस्सी से टांग दिया। फिर सावधानी से किवाड़ बंद करके मैं खुशी-खुशी भीतर चला गया। खा-पीकर जब मैं अपने बिस्तर पर लेटा, तो दुनिया में मुझसे खुश इंसान कोई नहीं था।

इसी में न जाने कब मेरी आंख लग गई।

5

लेकिन रात को मैंने एक अद्‌भुत सपना देखा.....

क्या देखता हूं कि.... हमारा सारा गांव बैलगाड़ियों पर सवार होकर किसी घने जंगल में से गुज़र रहा है।





घनघोर अंधेरी रात है। सरदी का मौसम है। दांत से दांत बज रहे हैं। और बैलगाड़ियों की पता नहीं कितनी लंबी कतार चली जा रही है।

अब, एकाएक न जाने क्या हुआ कि गाड़ियों में जूते बैल-सबके सब-एकदम भड़के। फिर घुटने टेक कर वहीं बैठ गए। यह देखकर हम सब इतने डरे कि झट बैलगाड़ियों से उतर पड़े। मगर उतरने की देर थी कि सारे बैल मुस्तैदी से उठ कर खड़े हो गए। फिर इससे भी अद्‌भुत बात हुई। एकाएक बैलगाड़ियां ज़मीन से दो-तीन हाथ ऊपर उठ कर अधर में लटक गई। और फिर देखते ही देखते एकदम फिसलती हुई दू...र आकाश में ओझल हो गई। ऐसा लगता था जैसे बैलगाड़ियां नावें हों और बैल टांगों से चप्पू चलाते हुए जा रहे हों।

यह देखकर हमारे अचरज की सीमा नहीं रही। मुंह से बोल नहीं निकल रहे थे। जब थोड़ा संभले तो लगे

सब बातें करने। कोई कहता, भूत-प्रेत गाड़ियों को उड़ा कर शायद प्रेतलोक में ले गए हैं!

कोई कुछ कहता, कोई कुछ।

सबके चेहरों पर हवाइयां उड़ रही थीं। चारों तरफ घुप्प अंधेरा और घनघोर सन्नाटा था। किसी के पास कोई कपड़ा नहीं था। कड़ाके की सरदी थी और बचने का और उपाय न था। किसी के पास दियासलाई तक नहीं थी कि रोशनी करके देखें कि हम कहां खड़े हैं। हां, रास्ते के दोनों तरफ घना जंगल था। ऊंचे छतनार पेड़ देवों की भांति सिर उठाए खड़े थे। देख-देख कर कलेजा मुंह को आता था।

फिर किसी ने कहा, "यहां खड़े क्या देख रहे हो? आगे बढ़ो। राम भली करेंगे।"

इस पर सब लोग चल पड़े, हालांकि कोई नहीं जानता था कि कहां जा रहे हैं? फिर ज्यों-ज्यों हम





आगे बढ़ते जा रहे थे, रास्ता और तंग होता जा रहा था। ऐसा लगता था जैसे संकरी घाटी में मनुष्यों की नदी बह कर जा रही हो।

मेरे छोटे भाई गोपी ने मां की उंगली पकड़ रखी थी। रह-रह कर वह रोने लगता था। मगर तभी जैसे पीछे से भागते हुए लोगों का एक रेला आया और रोला मचाते हुए आगे निकल गया। आखिर रेल-पेल खत्म हुई। हमारे तो हाथों के तोते ही उड़ गए जब हमने देखा कि गोपी गायब है! मां बावरी-सी खड़ी देख रही थी। कह रही थी, "अरे, अभी-अभी तो मेरी उंगली पकड़े मेरे साथ चल रहा था। कहां गया?" और फिर मां ने जो रोना-धोना शुरू किया, तो फिर चुप न हुई। सबने समझाया कि बस तसल्ली करें। बालक मिल जाएगा। मगर मां के आंसू थे कि थमते ही नहीं थे।

बात भी बड़ी हैरानी की थी।

अभी-अभी तो गोपी हमारे साथ था।

एकाएक गायब कैसे हो गया?

जब बात फैली, तो सारे काफिले में खलबली मच गई। सब लोग गोपी का



नाम ले-लेकर पुकारने लगे। मगर गोपी जैसे सबकी आंखों में धूल झोंक कर गायब हो गया था।

रो-रोकर मां का तो बुरा हाल हो गया। वह पगलाई-सी चिल्ला रही थी। सारा काफिला भी जैसे बौरा गया था।

तभी एकाएक गोपी के रोने की आवाज़ हमारे कानों में पड़ी, तो सब एकदम ठिठक कर देखने लगे। यह आवाज़ कहां से आ रही है? अंधेरा इतना था कि हाथ को हाथ सुझाई नहीं देता था। गोपी के रोने और बिलखने की आवाज़ तेज होती जा रही थी।

इस पर सब लोग उसी दिशा में भागे जिस दिशा में लगता था कि आवाज़ आ रही है। अंधेरा तो पहले ही था। अब जब लोगों के पैरों से धूल उड़ी, तो अंधेरा और गहरा हो गया।

इसके साथ ही बिजली कौंधी। उसकी रोशनी में हमने देखा कि रास्ता आगे ऊंचे-ऊंचे पहाड़ों में खो गया है। यह देखकर सबका बुरा हाल हो गया। मगर आगे जब किसी शेर की दहाड़ और हाथी कि चिंघाड़ सुनाई पड़ी तो सबकी घिग्घी बंध गई।

इसके साथ ही एक बार फिर बिजली कौंधी। हम क्या देखते हैं कि रास्ते के बीचो-बीच एक शेर बैठा है। शेर को देखते ही, बच्चों के क्या, बड़ों के भी प्राण गले तक आ गए।

तभी शेर का ठहाका गूंजा। उसका ठहाका इतना डरावना था कि सबके रोंगटे खड़े हो गए। इसके साथ ही पीछे कहीं से गोपी के रोने-बिलखने की आवाज़ भी आ रही थी।

मां ने बेटे की आवाज़ सुनी, तो दौड़ी। न तो वह शेर से डरी, और न अंधेरे से। मां जो थी! एकदम उधर भागी जा रही थी जिधर से गोपी की आवाज़ सुनाई पड़ रही थी।

"मां, रुक जा!" उसके पीछे-पीछे भागते हुए मैंने उसे रोका। बाकी लोग भी आगे आए।

इस पर शेर जैसे मां की खिल्ली उड़ाते हुए बोला, "क्यों, अपने बेटे को देखने जा रही हो!"

शेर को मनुष्य की बोली बोलते देख हम जैसे वहीं जड़ हो गए! इस पर शेर ने एक और ठहाका मारा। फिर बोला, "आदमी बड़ा डरपोक होता है... हैं..हैं...हैं" फिर हंसते हुए उसने यह बात इस तरह कही, जैसे हमें बच्चों की तरह बहला-फुसला रहा हो। बोला, "डर-खतरे की कोई बात नहीं है। तुम्हारा बेटा सही-सलामत है! अब तुमसे क्यों छिपाऊं? मेरी कोई संतान नहीं है। मेरे मंत्री गजदत्त का कहना था कि यदि मैं आदमी का बच्चा पाल लूं तो मेरे भी औलाद हो सकती है..."

मां ठगी-सी खड़ी थी और आंखों में आंसू भर कर शेर की तरफ देख रही थी। फिर जैसे आंचल पसार कर, दया की भीख मांगते हुए बोली, "मेरे बेटे को मुझे दे दे।"

गांव के बाकी लोग भी हाथ जोड़ कर शेर से बिनती करने लगे, "महाराज, इस बुढ़िया के बच्चे को छोड़ दो। तुम्हारी बड़ी दया होगी। बुढ़िया असीसें देगी। तुम्हारा नाम ले-लेकर जिएगी!"

शेर ऐसे बैठा था जैसे इस बात को मन ही मन गुन रहा हो। फिर धीमे-धीमे मुस्काते हुए बोला, "ठीक है, जाओ, आगे पिंजरे में तुम्हारा बेटा बंद है। निकाल कर साथ ले जाओ।"

इसके साथ ही एक बार फिर बिजली कौंधी और हमने जो कुछ देखा, उससे तो हमारा रोआं-रोआं ही कांप गया। एक खुला मैदान था और उस मैदान के बीचो-बीच एक बहुत बड़ा पिंजरा रखा था। उसके भीतर गोपी खड़ा सुबक रहा था।

सबसे पहले मां भागी। उसके पीछे मैं भागा। और फिर सारा गांव भागा आया।

हमें देखते ही गोपी पिंजरे की सलाखों को पकड़ कर ज़ोर-ज़ोर से रोने लगा, "मुझे बचा लो। नहीं तो शेर मुझे खा जाएगा।"

मां ने दौड़ कर पिंजरे को जा पकड़ा था। वह "बेटा-बेटा" कह कर पुकार लगा रही थी।

इतनी देर में सारा गांव पिंजरे के चारों तरफ इकट्ठा हो गया था। सब लोग दौड़-दौड़ कर देख रहे थे कि पिंजरे का दरवाज़ा कहां है। यदि दरवाज़ा था, तो किसी को दिखाई नहीं देता था। गोपी रो-रोकर गुहार कर रहा था, "मां, मुझे बचा लो। यहां से छुडाओ। नहीं तो जानवर मुझे खा जाएंगे।"



और मां थी कि पिंजरे की सलाखों के साथ जैसे माथा फोड़ने पर उतारू हो गई थी।

शेर यह सब देख-देख कर खुश हो रहा था। इसलिए एक बार फिर ठहाका मार कर हंसा और बोला, "डरपोक लोग! जाओ, अपने घर लौट जाओ। पिंजरे की सलाखों से माथा मत फोड़ो। इसकी जड़ें तो पाताल में हैं।"

शेर की यह बात सुनकर तो जैसे मां एकदम चीखीं और वहीं ग़श खाकर गिर पड़ीं....

6

... और इसके साथ ही मेरी नींद भी खुल गई। मैं हड़बड़ा कर उठ बैठा। मैंने देखा कि मैं जंगल में नहीं, बल्कि अपने बिस्तर पर बैठा हूं। मगर लगता था, शेर की दहाड़ अब भी मेरे कानों में गूंज रही थी।

पता नहीं मुझे क्या सूझी कि रज़ाई परे फेंक कर मैं उठा और बाहर भागा।

आंगन में सुबह का उजाला फैल चुका था। मैं उनींदी आंखों को मलते हुए देख ही रहा था कि डेवढ़ी में से तोते के चिल्लाने की आवाज़ मेरे कानों में पड़ी। मैं नंगे पैरों दौड़ गया। यह देखकर मेरे तो प्राण ही निकल गए कि डेवढ़ी के किवाड़ खुले थे। लेकिन ज्योंही मैं भीतर गया, पिंजरे के ऊपर चढ़ी एक बिल्ली एकदम कूदी और दरवाज़े से निकल कर भाग गई।



मेरा तो कलेजा ही दहल गया। तोता डर के मारे चिल्ला रहा था। मगर खैरियत यह थी कि वह बाल-बाल बच गया था।

यह देखकर मेरी जान में जान आई। मगर मैं यह सोचकर कांप उठा कि थोड़ी-सी भी देर हो गई होती, तो बिल्ली तोते को मार डालती।

मुझे देखते ही तोते ने धीरे से टांय-सी आवाज़ निकाली, जैसे मेरा धन्यवाद कर रहा हो कि मैं वक्त पर आ गया। फिर चुपचाप आंखें बंद करके बैठ गया।



कुछ देर मैं खड़ा उसे निहारता रहा। फिर मेरे मन में न जाने क्या समाई कि मैंने वहीं खड़े-खड़े ही एक बार फिर प्रण किया: "मैं इस तोते को कैद नहीं रखूंगा। इसे अभी, इसी वक्त, आज़ाद करता हूं।"

फिर मैंने दूसरी बात नहीं सोची। धीरे-धीरे चल कर मैं गया। पिंजरा उतारा। उसे हाथ में लिए मैं बाहर आंगन में आया और वहां पिंजरे का दरवाज़ा खोल दिया।

तोते ने अचानक आंखें खोल कर देखा। फिर धीरे-धीरे दाएं-बाएं सिर घुमाया, जैसे अचरज कर रहा हो कि वह भी कहीं सपना तो नहीं देख रहा है!

फिर दो कदम चल कर वह पिंजरे के दरवाज़े तक आया और फुर्र से उड़ गया।

खाली पिंजरा हाथ में पकड़े मैं चकित आंखों से देख रहा था। यह तोता रात को आया था, तो घायल था। अब यकायक उड़ कैसे गया? क्या रातों-रात इसकी चोट ठीक हो गई ? या क्या आज़ादी पाकर तोते में इतनी हिम्मत आ गई कि वह पंख मारता हुआ उड़ गया ? □ □

6. The process of producing questions and their try-out, in itself, is an educative process. It clarifies the instructional objectives in fairly precise and detailed terms, trains the item-writers in framing appropriate questions and in techniques of item-analysis, and helps understand the various areas of content by developing detailed marking schemes.

7. The question bank assists teachers to incorporate evaluation as an integral part of teaching and learning by using the available evaluation material for formative and continuous evaluation.

PLANNING AND PREPARATION OF A QUESTION BANK:

The teachers may plan and develop their own question banks with the help of fellow subject teachers as a cooperative venture. However, they may also secure help from their local District Institute of Education and Training (DIET), State Council of Educational Research and Training (SCERT), College of Education, and other state agencies of education. The National Council of Educational Research and Training, New Delhi 110016 also provides know-how and sample materials for this purpose. The Department of Measurement, Evaluation, Survey and Data Processing of the NCERT has been

it is allowed for testing by different forms of questions. Even a form of question may sample the same content area measuring a different ability. This flexibility is useful to have ample scope for the test-writers for selecting a question of pre-determined form, testing a particular ability and content area.

4. The content validity of each question is ascertained by a group of subject teachers and subject specialists.

5. The item-characteristics, e.g. difficulty value, discrimination index, time allocation, etc. are known for each question by trying-out in actual class room situation.

6. Each item provides complete information with regard to class and subject, content unit and sub-unit, objective and its specification, form of question, time allocated, marks allotted, difficulty value, discrimination index, and date of try-out.

7. All questions of a particular form of questions use the same format

8. The language of the question is simple, clear, precise, and unambiguous in order to communicate the task intended exactly and effectively.

9. The questions needed for various purposes are made available, e.g. for prognosis, diagnosis, written tests, oral tests, practical tests, classroom teaching, project work and assignments.

10. The question provides a fool-proof scoring key or a detailed analylitical marking scheme invariably.

Thus, a question bank is a scientifically classified and organised collection of a large number of questions of good quality and their answers (or scoring key and marking scheme) which are appropriately defined in terms of their item-characteristics.

FUNCTIONS OF A QUESTION BANK:

Question banks are developed to fulfil certain pre-determined purposes. In general, it makes available to the teachers and paper-setters a large number of [illegible] [illegible]tions along with the associated information for their day-to-day use. A proper use of them by the teachers makes evaluation a part and parcel of the teaching learning process brings quality improvement in school instruction, helps to better understand the curriculur materials, and influences the development and improvement of curricula. It is useful to teachers, paper-setters, examining agencies and students in a number of ways as mentioned below.

working for examination reform since long.

The purpose for preparing question-banks should be made clear in advance. In general, as stated earlier, its primary function is to provide good objective-based questions of various forms for organising instruction, giving pupils class-work and home-assignments, preparing unit tests and oral test, diagnosing pupils' strength and weaknesses for remediation, developing question-papers for terminal examinations, etc. These tasks should be viewed, in advance, so that appropriate questions may be had in the question bank accordingly. The following procedure would be useful in developing an appropriate question bank.

FIRST STEP PREPARATION OF DESIGN AND BLUE PRINT

1. A detailed list of instructional objectives is developed class-wise and subject-wise.

2. The subject matter is organised into meaningful units, if it is not already done.

3. Appropriate forms of questions should be selected, i.e. long-answer (or essay), short-answer, very-short-answer, multiple-choice, column matching, master-matching, completion and true-false questions. Their various dimensions should also be fixed as discussed

in the previous [illegible] entitled "Techniques of constructing Good Questions".
Keeping in view the three dimensions of a question, unit-wise designs and blue-ptints for the question bank should also be developed. In general the following decisions may help in developing a design:

(a) <u>Weightages to Objectives:</u>

Knowledge	:	30% marks
Understanding	:	45% marks
Application and Skill	:	25% marks

(b) <u>Weightages to Forms of Questions:</u>

Long-Answer Questions	:	20% marks
Short Answer Questions	:	40% marks
Very Short Answer Questions	:	20% marks
Objective Questions	:	20% marks.

(c) <u>Weightages to Content Sub-units:</u>

If the sub-units have almost similar significance and require almost the same time for teaching them; it would be better to allocate similar weightages to them. If not, the relative weightages in terms of percentages of marks may be decided considering the significance and

and depth of the unit.

(d) Weightages to item difficulty:

Difficult Questions: 30% marks

Average Questions: 50% marks

Easy Questions : 20% marks.

(e) Parallel Questions:

Usually long-answer questions have internal options. Therefore, parallel questions for each question (or as desired) should also be planned to construct.

(f) Parallel forms of question papers

Certain schools need parallel forms of the question-papers. If that is so, mention in the design may be recorded accordingly so that item-writers may construct enough parallel questions of various forms of questions.

Proforma similar to that employed for unit tests and examination papers is used for this purpose (Appendix -B). On similar lines, blue-print for the question bank is prepared.

SECOND STEP : CONSTRUCTION OF QUESTIONS

1. The construction of questions should follow the guidelines laid down by the blue print. However, there should be a conscious effort to frame question to all possible specifications. A proforma provided in Appendix - C would be useful in locating which of the specification is left out altogether.

2. Each question is written on an item-sheet and its marking scheme or scoring-key is also prepared simultaneously. A proforma of item-sheet and scoring-key and Marking scheme is given in Appendix - B.

3. The questions constructed and used in the tests of previous years if any, are also reviewed critically by using a "check-list" for the improvement of questions encloses in Appendix-A. Approved items are selected and stored in the question-bank.

4. Each question should be critically reviewed and improved accordingly by a group of subject teachers.

THIRD STEP: CODING AND CLASSIFICATION OF QUESTIONS

The questions should be appropriately coded for classification and storage in such a manner that the desired question can easily be located. A tentative plan for coding is given in table 5 If the questions are to be stored by computers, a ten digit code is to be employed. For example, the question mentioned in table number 4 given below may be coded as 405/052/431 However, the same may be coded as SS/Bio/S.29/MC/A-1 when stored manually.

FOURTH STEP: TRY-OUT OF QUESTIONS:

The questions should be tried-out in order to obtain statistical data about how they behave with a sample. The main statistical procedure used is item-analysis, specially to know the difficulty value and discrimination index of each question. This helps in knowing the [illegible] of the question and on this basis, in retaining, modifying or rejecting an item.

TABLE 4: SAMPLE QUESTION

which of the following substances transfers energy from the light reaction step to the dark reaction step,?

(1) Chlorophyll (3) ATP

(2) Water molecule (4) ADP

TABLE 5: A TENTATIVE PLAN FOR CODING

PARTICULARS	CODE FOR THE MANUAL STORING	CODE FOR THE COMPUTER STORING
Classes, e.g.,	Abbreviated form	One digit
Lower Primary	LP	1
Upper Primary	UP	2
Secondary Classes	SC	3
Senior Secondary.	SS	4
Subjects, e.g.	Abbreviated form	
Environmental Study	Environ	01
Science	Sci	02
Physics	Phy	03
Chemistry	Chem	04
Biology	Bio	05
Mathematics	Math	06
Units, e.g. Units of SS/Bio.	Unit Numbers	
Multicellularity in plants	U-5	05
Multicellularity in Animals.	U-6	06
Sub-Units, e.g. of SS/Bio/U-5	Chapter numbers	two digits
Morphology and anatomy.	5.26	26
Absorption and movement of water.	5.27	27
Mineral and N_2 Nutrition	5.28	28
Photosynthesis	5.29	29
Reproduction	5.30	30
Form of Question e.g.	Abbreviated form	One digit
Long Answer (or Essay)	LA	1
Short Answer	SA	2
Very Short Answer	VSA	3
Multiple-choice	MC	4
True false	TF	5.

	Matching (or column) Matching)	Mat	6
	Completion	Comp	7
6.	Instructional Objectives, e.g.	Abbreviated form	One digit
	Knowledge	K	1
	Understanding	U	2
	Application	A	3
	Skill	S	4
7.	Specifications, e.g. of appli-catiin :	Arabic numeral :	One digit
	Analyses	1	1
	Gives reasons	2	2
	Establishes relationship	3	3
	Makes hypothesis	4	4
	Develops an alternate or plan of action	5	5
	Predicts	6	6
	Infers	7	7
	Generalizes	8	8
	Judges	9	9

STEP V: STORAGE OF QUESTIONS IN QUESTION BANK:

The questions may be written on cards of having a size 8" x 5" for storing them manually in steel almirah with 4-5 cabinets. It is advisable to classify them in the sequence, class-subject-unit- topic-form of question and instructional objective wise. The same sequence may be followed as stated earlier for coding and computer storing.

HOW TO MAKE USE OF QUESTION BANKS

The question bank contains a large number of questions of various forms on each unit of a subject. It can be used by teachers, paper-setters and pupils as follows:

1. Teachers may select suitable questions, specially very short answer questions for their day-to-day teaching, i.e., for introducing, developing and reviewing a topic or unit of study.

2. Teachers should also make use of question-banks for preparing unit tests, periodical tests and terminal examinations. For this purpose, they should develop the design and blue print and then, select questions according to the requirement of the blue print.

3. Teachers may also use question banks for selecting suitable tasks or questions for project work, class-work and home assignments, oral tests, and practical tests,

4. Paper-setters should also use question-banks for preparing good question-papers for public examinations. They should first develop the blue print on the basis of the design provided by the Examining agency, and then should select appropriate questions from the question-bank as per requirement.

However, they must not copy-out questions testing application. It would always be better to frame new application questions or use questions after having made certain changes.

5. Students should also get a set of selected questions from the question bank on each unit. This would educate them for about type of questions, scope and style of answers, and method of scoring.

REVIEW AND AUGMENTATION OF QUESTION BANK

The questions of question bank should be reviewed every year and out dated qunstions must be replaced by new ones. If there is a change in the curriculum, all the questions should be reviewed and updated and re-coded if necessary. In addition, enrichment of the question should always be given due importance. Such a question bank bank is definitely liable to bring improvement in teaching and learning, on one hand, and will help regain faith in out examination system on the other.

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ONE

MULTIPLE - CHOICE QUESTIONS

Multiple-choice questions are employed in knowing pupil achievements involving a wide variety of instructional objectives belonging to the congnitive domain except abilities involving organisation and expression of ideas.

Objective-based multiple-choice test items are provided here, each with four alternatives in 1.1 along with their 'Key' in 1.2 and "Question-wise analysis" in 1.3 All questions are one mark each.

1.1 SAMPLE MULTIPLE-CHOICE QUESTIONS

1. Which are of the following diseases is a non-infectious disease?
   (1) Small pox
   (2) Heart attack
   (3) Malaria
   (4) Cholera

2. Which of the following scientists discovered penicillin ?
   (1) Alexander Flaming
   (2) Edward Jenner
   (3) Marie Curie
   (4) Leeuwenhock.

3. Which of the following is the fastest mode of transport in India ?
   (1) Steamer
   (2) Electric train
   (3) Aeroplane
   (4) Car.

4. Which of the following invented by scientists for prevention of infectious diseases ?

(1) Penicillin

(2) Vaccine

(3) Polonium

(4) Radium.

5. Suppose you have to buy quality mangoes from your local market. You have not done this task earlier, which of the following steps would you like to take first ?

(1) Observation of mangoes for their quality.

(2) Collection of information about good quality mangoes.

(3) Collection of data about the local price of the good quality mangoes.

(4) Thinking about the price of the good quality mangoes.

6. Which one of the following is a good use of scientific knowledge for all people ?

(1) Bullets

(2) Bombs

(3) Narcoties

(4) Television.

7. The eradication of small pox has been mainly due to

(1) Vaccination.

(2) taking vitamins,

(3) drinking more mulk in the diet.

(4) taking more proteins in the diet.

8. In all compounds the molecules are always of

(1) one kind of atoms only.
(2) different kinds of atoms.
(3) only two kinds of atoms.
(4) at the most three kinds of atoms.

9. Which one of the following sets of substances comprises of only non-metallic elements ?

(1) Silver, sulphur and oxygen
(2) Sulphur, Oxygen and carbon
(3) Oxygen, carbon and copper
(4) Carbon, copper and sugar

10. Any material having different kinds of atoms cannot be classified as

(1) a mixture.
(2) a compound.
(3) an element.
(4) a solution.

11. A student transferred 50 ml of water into four vessles of similar size but of different shapes. On observation, he recorded that water always took the shape of the vessel. Which one of the following conclusions can be drawn safely based on these observations ?

(1) Liquids change their shape but their volume remains fixed.
(2) Water takes the shape and volume of the vessel in which it is poured.
(3) Water does not have a fixed shape.
(4) water always has a fixed volume.

12. In which one of the following mixtures will you need a separating funnel to separate the components ?

(1) Alcohol and water

(2) Coconut oil and water

(3) Sand and water

(4) Sugar and water

13. Which one of the following processes is almost similar to hand-picking ?

(1) Loading

(2) Centrifugation

(3) Crystallization

(4) Magnetic separation.

14. Which of the following mixtures can be separated only by sublimation ?

(1) Common salt and camphor

(2) Common salt and ammonium chloride

(3) ammonium chloride and camphor

(4) Iron filings and Iodine.

15. Ramesh collected water from a pond in a glass container. He noticed that it was muddy due to the presence of very fine suspended clay particles. He used alum to get clear water from it. Which of the following sequences of processes would be involved in this work ?

(1) Sedimentation-Loading-Decantation

(2) Decantation-loading-Sedimentation

(3) Loading-Sedimentation-Decantation

(4) Loading-Decantation-Sedimentation

16. A mixture of salt and ammonium chloride can be separated by

(1) decantation.

(2) distillation.

(3) sublimation.

(4) dissolving in water.

17. Three liquids, P,Q and R have boiling points $70^{\circ}C$, $50^{\circ}C$ and $90^{\circ}C$ respectively. In which one of the following sequences will the liquids distil over ?

(1) Q, P, R

(2) R, P, Q

(3) Q, R, P

(4) P, Q, R

18. The area of a feather can be determined by

(1) meter scale.

(2) thread and metre scale.

(3) graph paper.

(4) measuring tape.

19. One metric ton is equal to

(1) $\frac{1}{100}$ quintal.

(2) $\frac{1}{10}$ quintal.

(3) 10 quintals.

(4) 100 quintals.

20. Which one of the following sets represents the standard units of length, mass and time ?

(1) Centimetre, gram and minute

(2) Metre, gram and second

(3) Centimeter, kilogram and hour

(4) Metre, kilogram and seconds

21. Krishan a student of class VI measured the length of a table with his handspan and found it equal to 10 handspans. His teacher also measured the same table with his own handspan but found it equal to 8 handspans only. Which of the following reasons may be the most probable explanation for this difference in measurement ?

(1) Krishan has committed mistake in counting handspans during the measurement.

(2) Krishan's teacher has committed mistake in counting his handspans during the measurement.

(3) Krishan handspan is larger than that of his teacher.

(4) Krishan's handspan is smaller than that of his teacher.

22. The full moon and the new moon nights occur every month. Such changes are recognised as

(1) reversible.

(2) periodic.

(3) chemical.

(4) irreversible.

23. When a match stick is struck on the side of a match box, it catches fire. The side of the match box also gets a scratch. It means that an interaction between two substances may

(1) affect both partners.

(2) damage both partners.

(3) produce fire .

(4) damage one or the other.

24. Given that

(i) a glass tumbler breaks,

(ii) Iron rusts.,

(iii) milk changes into curd,

Now which one of the following changes holds good (i) and (ii) but not for (iii).

(1) Chemical change

(2) Fast change

(3) Irreversible change

(4) Undesirable change

25. Which set of the three changes in each case belongs to periodic and reversible type ?

(1) Burning of paper, swinging of a pendulum, earth quakes.

(2) Phases of moon, change of seasons, ageing.

(3) Beating of heart, weathering of rocks, falling of leaves.

(4) Wheels of a moving jeep, high and low tides, movement of a hand-saw while in use.

26. Which one of the following changes cannot be controlled ?

(1) Rusting of iron

(2) Formation of curd

(3) Falling of leaves

(4) Occurence of full moon

27. Which one of the following is a periodic change ?

(i) Yawning

(2) Hour-hand of a working clock

(3) Dissolving of sugar in water

(4) Melting of ice-cream

28 Which one of the following is a slow and desirable change ?

(1) Dead plants decay to form manure.

(2) The iron-grill of a house gets rusted,

(3) A lamp is lighted with a match-stick.

(4) A tree is uprooted during a storm.

29. A substance is added to water, brisk evolution of a gas takes place and container becomes hot, This represents a

(1) chemical change involving absorption of energy.

(2) chemical change involving production of energy.

(3) physical change involving production of heat

(4) physical change involving absorption of heat

30. The substances X and Y were put separately in two tumblers of water A and B respectively. Lot of water vapours and tiny drops of water were seen in tumblers A & B respectively. The changes involved in tumblers are

(1) Energy is evolved on addition of X and Y.
(2) Energy is absorbed on addition of X and Y.
(3) Energy is absorbed on addition of X and energy is evolved on addition of Y.
(4) Energy is evolved on addition of X and energy is absorbed on addition of Y.

31. Which one of the following sets of three changes each, belongs to periodic and reversible types ?

(1) Seasonal changes, stretch of a rubber band, high and low tides.
(2) Burning of paper, pendulum swings, earthquakes.
(3) Phases of moon, rusting of iron, ageing
(4) Heart beats, weathering of rocks falling of tree leaves.

32. Halley's coment appeared in the years 1910 and 1986. It will again appear in the year 2062. This represents a

(1) Physical change.
(2) Periodic change.
(3) Non-periodic change.
(4) Chemical change.

33. Which one of the following motions is a random moti[illegible]
(1) The motion of a fly
(2) A ball rolling on the ground
(3) Vibrations of a stretched string
(4) An Athlete's run on a circular track

34. Which one of the following sets of lever possesses fulcrum in between the lead and effort?
(1) A bottle opener and a fishing rod.
(2) A fishing road and a beam balance.
(3) A beam balance and a pair of pliers.
(4) A pair of pliers and a bottle opener.

35. An athlete runs four rounds on a circular track. Suppose she takes the same time in each and every round. Then her motion can be classified most appropriately as
(1) periodic linear motion.
(2) periodic circular motion.
(3) circular motion only.
(4) linear motion only.

36. Which of the following organisms is active during the day ?
(1) Earthworm
(2) Moth
(3) Housefly
(4) Mosquito

37. Which of the following animals is a vertebrate ?

(1) Amoeba

(2) Spider

(3) Earthworm

(4) Pigeon

38. A student found that Mango tree may produce newer branches almost every year. Hydrilla plant produces new leaves in almost every season. The branches of Neem tree go on increasing year after year but man and monkey do not increase in length after a particular age. The Amoeba does not also enlarge after attaining a particular size. Which of the following conclusions could be drawn on on the basis of this information?

(1) All plants and animals grow throughout their life.

(2) All plants and animals have a varied life span.

(3) All organisms exhibit growth.

(4) All organisms have a fixed period of growth.

39. Which of the following organisms is a microscopic animal ?

(1) Mushroom

(2) Octopus

(3) Amoeba

(4) Snail

40. Which one of the following is the simplest living organism in its organisation ?

(1) Wheat plant

(2) Amoeba

(3) Hydra

(4) Moss plant

41 Which one of the following is the simplest living organism in its organisation ?

(1) Wheat plant

(2) Amoeba

(3) Hydra

(4) Moss plant

42. Which of the following is a thread like organism ?

(1) Paramoecium

(2) Spirogyra

(3) Tapeworm

(4) Earthworm

43. Which of the following characteristics is common to butterfly, mosquito, sparrow, and vulture ?

(1) All can fly with the help of wings.

(2) All eat plant products as food.

(3) All increase in size throughout their life.

(4) All possess bones.

44. When you go to a garden you observe earthworms, butterfly, sparrow, snake, rabbit and a dog.

Which one of the following characteristics is common in them ?

(1) Laying eggs

(2) Moving with their limbs

(3) Flying in air

(4) Respiring.

45. The group of animals which can interbreed among themselves are categorised as

(1) family.

(2) genus.

(3) community.

(4) species.

46. Which one of the following characteristics is most essential for the aquatic life of a fish ?

(1) Tail

(2) Fins

(3) Gills

(4) Streamlined body.

47. Water was thoroughly boiled and then allowed to cool in a closed vessel. This water was filled in an open aquarium. Immediately after this, following four animals were transferred into it. Which one of them would have died soon?

(1) Frog

(2) Fish

(3) Turtle

(4) Water snake

48 The character shared by the whale and a bat is the possession of

(1) hairs.

(2) Wings.

(3) limbs.

(4) neck.

49. Which one of the following sets of animals is similar in having a backbone ?

(1) Man, dog, snake and earthworm

(2) Dog, snake, fish and pigeon

(3) Snake, fish, starfish and pigeon

(4) Fish, pigeon, scorpion and man

50. Which of the following organs belongs to the circulatory system ?

(1) Kidney

(2) Pancreas

(3) Brain

(4) Heart

51. Which of the following senses would help you to distinguish between ice and ice-cream with your eyes closed ?

(1) Sense of heat

(2) Sense of cold

(3) Sense of touch

(4) Sense of pain

52. Relationship between banyan tree and supporting root is almost the same as between

(1) pea plant and leaf tendril.

(2) maize and tap root.

(3) potato and swoollen root.

(4) passion flower and leaf tendril.

53. Krishan uprooted a plant and then fixed in an earthen pot. He watered the plant. Later he obserbed that the plant started wilting. One of the most probable explanation is that the uprooted plant failed to

(1) transport water to the leaves.

(2) absorb water from the soil.

(3) retain water in the leaves.

(4) avoid loss of water from the leaves.

54. Aerial roots in Banyan tree mainly serve for

(1) supporting the plant.

(2) storing the food.

(3) exchange of gases.

(4) preparation of food.

55. In which of the following plants the stem carries out the function of leaves?

(1) Banana

(2) Jamun

(3) Rose

(4) Cactus

56. Which set of two structures is found in a bisexual flower ?

(1) Sepals and carpels

(2) Stamens and sepals

(3) Carpels and petals

(4) Stamens and carpels

57. Which one of the following functions belongs to Stems normally ?

(1) Absorption of water

(2) Conduction of water and Nutrients

(3) Absorption of water and minerals

(4) Fixation of the plant in the ground.

58 Which of the following plants has simple leaves ?

(1) Kikar

(2) Neem

(3) Papaya

(4) Rose

59. Primary root which persists throughout the life of the plant is called as

(1) tap root.

(2) fibrous root.

(3) adventitous root.

(4) aerial root.

60. Which one of the following structures represents the male part of a flower?

(1) Sepals

(2) Petals

(3) Carpels

(4) Stamens

61. Which of the following sets of plants possesses leaves with several leaflets?

(1) Rose, neem and kikar

(2) Rose, pipal and radish

(3) Rose, pipal and papaya

(4) Radish, neem and tomato

62. Which one of the following structures is NOT a part of leaf?

(1) Leaf stalk

(2) Leaf blade

(3) Leaf base

(4) Leaf bud

63. Water and nutrients are absorbed by the roots from the soil through

(1) root cap.

(2) root hair.

(3) zone of elongation.

(4) zone of naturation.

64. Which of the following set of plants stores food material in their roots?

(1) Carrot, Radish, Sweat Potato

(2) Carrot, Radish, Potato

(3) Radish, Sweat Potato, Ginger

(4) Radish, beat, potato

65. Which one of the following pairs of functions are normally performed by green leaves ?

(1) Respiration and reproduction

(2) Respiration and synthesis of food

(3) Synthesis of food and absorption of water

(4) Reproduction and absorption of water

66. Leaves of green plants are very important because I help to

(1) give shape to the plant.

(2) make earth cool and green.

(3) make the plant beautiful.

(4) produce food for all life on earth.

67. Which of the following organism has Head, Neck, throax and Abdomen ?

(1) Frog

(2) Man

(3) Fish

(4) Earthworm

68 In a collection of animals, male and female specimens were grouped separately. However, in one animal this type of grouping was not possible. This animal was

(1) Cockroach.

(2) rabbit.

(3) fowl.

(4) earthworm.

69. During certain months of the year some trees lose all their leaves. This results in loss of

(1) respiration.

(2) synthesis of food.

(3) absorption of water from the soil.

(4) translocation of mineral salts.

70. Which one of the following animal is having both male and female reproductive systems like a bisexual flower ?

(1) Koel

(2) Earthworm

(3) Cow

(4) Frog

71. Relationship between ear and hearing is almost the same as the one between

(1) nose and smelling.

(2) eyes and light.

(3) heart and memory.

(4) brain and taste.

72. A young baby crawled to the kitchen where his mother had prepared "halwa" in which she had added some cordimum. In kitchen the baby located the hot "halwa" container and as soon as he tried to take some "halwa" out of it he withdrew his hand and screamed loudly. Which sequence of sense led the baby to scream ?

(1) Smell, touch, sight

(2) Touch, smell, sight

(3) smell sight touch

(4) Sight, smell, touch

73. The structures of eyes, ears and tongue differ. This is because they

(1) are positioned at different places in the body

(2) add to the beauty of an animal

(3) are sense organs

(4) perform different functions.

74. Your mother started observing a special type of fast in which she could take food prepared only from roots. She could take roots of

(1) potato, Carrot and radish.

(2) sweet potato, beet and carrot.

(3) carrot, potato and radish

(4) ginger, sweet potato and beet.

75. While playing in a garden a naughty child plucked plant leaf, tore it into several pieces and scatt it on the soil. After some days by chance he fou that some more plants of the same kind had come u at the places where he had thrown the pieces. Thi was because of

(1) vegetative reproduction

(2) sexual reproduction

(3) asexual reproduction

(4) seed germination.

76. Which of the following is the best sequences of events which involved when you run away seeing a d chasing you?

(1) Sight, information to brain, brain directs to run.

(2) Sight brain directs to run, brain collects information.

(3) Information to brain, sight, brain directs to run.

(4) Brain directs to run, sight, information to brain.

77. Fishes become restless when placed in distilled water due to non-availability of

(1) water plants

(2) dissolved oxygen

(3) mineral salts

(4) water insects.

78. The divers carry oxygen cylinders for breathing when they go deep into the sea because

(1) sea-water contains oxygen insufficient for breathing.

(2) sea-water contains carbon dioxide in higher concentration.

(3) man cannot take in oxygen dissolved in water.

(4) man does not like to take in oxygen of the sea-water.

79. Suppose green plants do not take in Carbon dioxide and give out Oxygen. In this situation the animals living in water would die due to

(1) non-availability of Oxygen.

(2) non-availability of food.

(3) accumulation of carbon dioxide.

(4) all of the above factors under 1,2 and 3.

80. Which of the following properties of water is most useful for the fishes living in it ?

(1) Solubility of Carbon dioxide

(2) solubility of Oxygen

(3) Odourless

(4) Freezes at $0^{\circ}C$.

81 Which one of the following pair of salts causes hardness of water?

(1) Sodium Chloride and Magnesium sulphate

(2) Potassium chloride and calcium chloride

(3) Calcium Chloride and Magnesium chloride

(4) Calcium sulphate and Potassium chloride

82. Which of the following sequence of processes is employed in purifying river water for drinking?

(1) Sedimentation, Chlorination and Filtration.

(2) Chlorination, Sedimentation and Filtration.

(3) Sedimentation, Filtration and Chlorination.

(4) Filtration, sedimentation and Chlorination.

83. Mohan determined the boiling point of two samples of water "A and B". It was found to be $100^{\circ}C$ and $103^{\circ}C$ for the samples 'A and B' respectively. On the basis of this observation he concluded that

(1) both samples contained pure water

(2) sample 'A' contained pure water.

(3) both samples contained impure water.

(4) sample 'B' contained pure water.

84. Which one of the following is different from the rest of three?

(1) Melting point of ice

(2) Boiling point of water

(3) Freezing point of water

(4) Zero degree celsius

85.

Calcium chloride	Magnesium chloride	Sodium chloride	Potassium chloride
(a)	(b)	(c)	(d)

Test tube (1) contains a+b in water

Test tube (2) contains c+d in water

Test tube (3) contains a+d in water

Test tube (4) contains b+c in water

Add a pinch of soap powder to each test tube and shake well. In whith test tube there would be much lather?

(1) Test tube (1)

(2) Test tube (2)

(3) Test tube (3)

(4) Test tube (4)

86. Givenbelow are four samples of water. Equal volumes of each sample is filtered and then evaporated which sample would you predict to leave more residue as compared to others?

(1) River water

(2) 10 metre deep well water

(3) 100 metre deep Tubewell water

(4) Canal water

87 Which of the following examples illustrates use of water as a medium of transportation by man?

(1) Water-borne diseases are transported by water from one place to another.

(2) Boats carry goods and people from one place to another.

(3) Seeds of several plants are carried away by water to far off places.

(4) Many animals swim in water for long distances in search of food.

88. Which of the following processes involves loss of water in the form of water vapour from plants?

(1) Photosynthesis

(2) Transpiration

(3) Reproduction

(4) Pollination

89. Mechanical work is said to be done when a student

(1) reads a book silently.

(2) pushes a wall of his class-room.

(3) drags a table from one place to another.

(4) remains standing on the bench for five minutes.

90. Which one of the following devices uses electric energy for doing mechanical work?

(1) Electric heater

(2) Electric fan

(3) Electric bulb

(4) Radio

91. Which one of the following devices usually converts chemical energy into electrical energy?

(1) Water wheel

(2) Electric fan

(3) Torch Cell

(4) Dynams

92. Which one of the following energy changes is most essential for the survival of life on earth?

(1) Change of light energy into chemical energy

(2) Change of chemical energy into light energy

(3) Change of chemical energy into heat energy

(4) Change of lignt energy into heat energy

93. Which of the following groups of substances is essential for the plants to prepare their food?

(1) Water, oxygen and sun light

(2) Water oxygen and carbondioxide

(3) Sunlight oxygen and carbondioxide

(4) Water, sunlight and carbondioxide

94. Which of the following causes decreases in rain fall?

(1) Deforestation and Industrial development

(2) Afforestation and Industrial development.

(3) Killing of animals and use of festilizers

(4) Killing of birds and use of pesticides

95. Which pair of organisms in the following are called decomposers?

(1) Birds and insects

(2) Spiders and wall-lizards

(3) Bacteria and fungi

(4) Lions and snakes

96. A person has an animal which can provide a large number of useful products. Which of the following group of products can be obtained from that animal?

(1) Egg, meat and milk

(2) Milk, meat and gelatin

(3) Gelatin, milk and egg

(4) Honey, milk and gelatin

97. Which one of the following is the source of coal?

(1) Plants

(2) Animals.

(3) Sand Rocks

(4) Stones

98. Which one of the following animals can provide leather.

(1) Starfish

(2) Cow

(3) Fish

(4) Crab

99. Which one of the following products is produced by using yeast?
   (1) Bread
   (2) Curd
   (3) Penicillin
   (4) Gelatin

100. An animal produces wax and honey. Identify that animal from amongst the following.
   (1) Bumble bee
   (2) Silk worm
   (3) Honey bee
   (4) Spider.

101. Which one of the following statements is correct?
   (1) Yeast is produced from the eggs of fishes.
   (2) Bones of many animals are used for malcing gelatin.
   (3) Honey is produced from guava fruits.
   (4) Silk is produced from a good variety of jute plant.

102. Which one of the following is produced from the stem of pine?
   (1) Fibre
   (2) Lac
   (3) Resins
   (4) Rubber.

103. Which one of the following statements is correct?

(1) Herbivorous animals eat other animals.

(2) Carnivorous animals eat both animals and plants

(3) Omnivorous animals eat only plants.

(4) Carnivorous animals eat other animals.

104. What is the purpose of the formation of webs by spiders?

(1) Decoration of their nests

(2) Catching small insects in the web

(3) Attracting other spiders

(4) Swinging for finding prey

105. Which one of the following sets of things is essential for the plants to prepare their food?

(1) Water, oxygen and sun light

(2) Water, oxygen and carbondioxide

(3) Sunlight oxygen and carbon dioxide

(4) water, sunlight and carbondioxide

106. Which of the following causes decreasesin rain fall

(1) Deforestation

(2) Industrial development

(3) Killing of wild animals

(4) Construction of large dams

107. Which one of the following pairs is grouped under decomposers?

(1) Birds and insects

(2) Spiders and wall lizards

(3) Bacteria and Fungi

(4) Lions and Snakes

108. Which one of the following groups of products can be obtained from one single kind of animal?

(1) Egg,meat and milk.

(2) Milk, meat and gelatin

(3) Gelatin, milk and egg

(4) Honey, milk and gelatin

109. To protect the slopes of a newly built road from soil erosion, a contractor wants to grow some plants along the two sides of the road. Which of the following plant would you suggest to him for this purpose?

(1) Mustard plants with long tap root

(2) Grasses with fibrous adventitious roots

(3) Potato plants with modified tuberous stem

(4) Onion plants with modified buobous stem

110. The nearest star to the earth is
(1) Pole-star.
(2) Sun.
(3) Sirus .
(4) Proxima Centauri.

111. Ursa major is also known as
(1) Kalpurush.
(2) Orion.
(3) Sapta rishi.
(4) Virgo.

112. Most of stars are actually bigger than the sun but appear small because they are

(1) less bright than the sun.

(2) nearer to the sun.

(3) nearer to the earth.

(4) far away from the earth.

1.2. SCORING KEY OF THE MULTIPLE - CHOICE QUESTIONS

Q. No.	Scoring Key	Q. No.	Scoring key
1	(2)	26	(3)
2	(1)	27	(2)
3	(3)	28	(1)
4	(2)	29	(2)
5	(3)	30	(4)
6	(4)	31	(1)
7	(1)	32	(2)
8	(4)	33	(1)
9	(2)	34	(3)
10	(3)	35	(2)
11	(3)	36	(3)
12	(2)	37	(4)
13	(4)	38	(3)
14	(2)	39	(3)
15	(3)	40	(2)
16	(3)	41	(2)
17	(1)	42	(2)
18	(3)	43	(1)
19	(3)	44	(4)
20	(4)	45	(4)
21	(4)	46	(3)
22	(2)	47	(2)
23	(1)	48	(1)
24	(4)	49	(2)
25	(4)	50	(4)

Q. No.	Scoring Key	Q.No.	Scoring Key
51	(3)	75	(1)
52	(1)	76	(1)
53	(2)	77	(2)
54	(1)	78	(3)
55	(4)	79	(4)
56	(4)	80	(2)
57	(2)	81	(3)
58	(3)	82	(3)
59	(1)	83	(2)
60	(4)	84	(2)
61	(1)	85	(2)
62	(4)	86	(3)
63	(2)	87	(2)
64	(1)	88	(3)
65	(2)	89	(2)
66	(4)	90	(2)
67	(2)	91	(3)
68	(4)	92	(2)
69	(2)	93	(4)
70	(2)	94	(1)
71	(1)	95	(3)
72	(3)	96	(2)
73	(4)	97	(1)
74	(2)	98	(2)

Q.No.	Scoring key	Q. No.	Scoring Key
99	(1)	106	(1)
100	(3)	107	(3)
101	(2)	108	(2)
102	(3)	109)	(2)
103	(4)	110	(2)
104	(2)	111	(3)
105	(4)	112	(4)

1.3 QUESTION-WISE ANALYSIS OF MULTIPLE-CHOICE QUESTIONS

Q.No.	Objective	Specification	Unit Number	Form of Question	Marks Allotted.	Estimated time (Minutes)	Estimated difficul level
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	U	Interprets	1.1	MC	1	1	B
2	K	Recognises	1.3	MC	1	1	C
3	U	Compares	1.1	MC	1	1	B
4	U	Identifies relationship	1.3	MC	1	1	B
5	A	Analyses	1.2	MC	1	1	A
6	U	Compares	1.1	MC	1	1	B
7	K	Recognises	1.3	MC	1	1	C
8	K	Recognises	2.4	MC	1	1	C
9	U	Classifies	2.3	MC	1	1	B
10	U	Extrapolates	2.4	MC	1	1	A
11	A	Infers	2.4	MC	1	2	A
12	K	Recognises	3.3	MC	1	1	C
13	U	Identifies relationship	3.2	MC	1	1	A
14	U	Discriminates	3.4	MC	1	1	A
15	A	Establishes relationship	3.3	MC	1	1	A
16	K	Recognises	3.2	MC	1	1	C
17	A	Analyses	3.4	MC	1	1	A
18	K	Recognises	4.3	MC	1	1	C
19	K	Recognises	4.5	MC	1	1	B
20	U	Identifies relationship	4.1	MC	1	1	B

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
21	A	Makes hypothesis	4.1	MC	1	1	A
22	K	Recognises	5.1	MC	1	1	C
23	A	Generalises	5.2	MC	1	1	A
24	A	Analyses	5.1	MC	1	2	A
25	U	Relates	5.1	MC	1	1	B
26	K	Recognises	5.1	MC	1	1	C
27	K	Recognises	5.1	MC	1	1	C
28	K	Recognises	5.1	MC	1	1	C
29	A	Analyses	5.4	MC	1	2	A
30	A	Analyses	5.3	MC	1	2	A
31	U	Compares	5.3	MC	1	1	B
32	K	Recognises	5.4	MC	1	1	C
33	K	Recognises	6.1	MC	1	1	C
34	U	Classifies	6.3	MC	1	1	B
35	A	Infers	6.1	MC	1	1	A
36	K	Recognises	7.1	MC	1	1	C
37	K	Recognises	7.3	MC	1	1	C
38	A	Infers	7.3	MC	1	2	A
39	K	Recognises	7.1	MC	1	1	C
40	U	Compares	7.1	MC	1	1	B
41	U	Compares	7.1	MC	1	1	B
42	K	Recognises	7.2	MC	1	1	C
43	U	Compares	7.2	MC	1	1	B
44	U	Explains	7.2	MC	1	1	B
45	U	Translates	7.2	MC	1	1	B

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
46	U	Identifies relationship	7.2	MC	1	1	B
47	U	Explains	7.2	MC	1	1	B
48	U	Identifies relationship	7.3	MC	1	1	B
49	U	Compares	7.3	MC	1	1	B
50	K	Recognises	8.2	MC	1	1	C
51	K	Recognises	8.3	MC	1	1	C
52	U	Relates	8.1	MC	1	1	B
53	A	Makes hypothesis	8.1	MC	1	2	A
54	K	Recognises	8.1	MC	1	1	C
55	K	Recognises	8.1	MC	1	1	C
56	U	Cites examples	8.1	MC	1	1	B
57	K	Recognises	8.1	MC	1	1	C
58	U	Cites examples	8.1	MC	1	1	B
59	K	Recognises	8.1	MC	1	1	C
60	K	Recognises	8.1	MC	1	1	C
61	A	Analyses	8.1	MC	1	1	A
62	K	Recognises	8.1	MC	1	1	C
63	K	Recognises	8.1	MC	1	1	C
64	U	Classifies	8.1	MC	1	1	B
65	U	Compares	8.1	MC	1	1	B
66	U	Relates	8.1	MC	1	1	B
[illegible]	[illegible]	Recognises	[illegible]	MC	1	1	C
68	A	Analyses	8.2	MC	1	1	B
69	U	Explains	8.2	MC	1	1	B

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
70	U	Relates	8.2	MC	1	1	B
71	A	Analyses	8.2	MC	1	2	A
72	A	Infers	8.2	MC	1	2	A
73	U	Interprets	8.2	MC	1	1	B
74	U	Classifies	8.1	MC	1	1	B
75	A	Infers	8.1	MC	1	2	A
76	A	Analyses	8.2	MC	1	2	A
77	K	Recognises	9.4	MC	1	1	C
78	U	Explains	9.3	MC	1	2	B
79	A	Predicts	9.1	MC	1	2	A
80	K	Recognises	10.3	MC	1	1	C
81	U	Compares	10.5	MC	1	1	B
82	U	Identifies relationship	10.2	MC	1	1	B
83	A	Judges	10.3	MC	1	2	A
84	U	Relates	10.3	MC	1	1	B
85	A	Infers	10.5	MC	1	2	A
86	A	Analyses	10.5	MC	1	2	A
87	K	Recognises	10.6	MC	1	1	C
88	K	Recognises	10.1	MC	1	1	C
89	K	Recognises	11.1	MC	1	1	C
90	K	Recognises	11.2	MC	1	1	B
91	U	Relates	11.2	MC	1	1	B
92	A	Judges	11.2	MC	1	1	A
93	K	Recognises	12.1	MC	1	1	C
94	U	Relates	12.3	MC	1	1	B

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
95	U	Classifies	12.2	MC	1	1	B
96	A	Analyses	12.1	MC	1	2	A
97	K	Recognises	12.1	MC	1	1	C
98	K	Recognises	12.1	MC	1	1	C
99	K	Recognises	12.1	MC	1	1	C
100	K	Recognises	12.1	MC	1	1	C
101	U	Compares	12.1	MC	1	1	B
102	K	Recognises	12.1	MC	1	1	C
103	U	Detects error	12.2	MC	1	1	B
104	A	Interprets	12.3	MC	1	1	A
105	K	Recognises	12.1	MC	1	1	C
106	U	Relates	12.3	MC	1	1	B
107	U	Classifies	12.2	MC	1	1	B
108	U	Compares	12.1	MC	1	1	B
109	A	Suggests alternative procedure	12.3	MC	1	2	A
110	K	Recognises	13.1	MC	1	1	C
111	K	Recognises	13.2	MC	1	1	C
112	U	Explains	13.1	MC	1	1	B

Note: Use abbreviations as follow:

(a) For objectives : K = Knowledge, U = Understanding,
A = Application, S = Skill

(b) For form of questions: MC = Multiple-choice
VSA= Very short-answer, SA=Short answer, LA=Long answer.

(c) For difficulty level of question: A= difficult,
B= Average, C=Easy.

VERY-SHORT ANSWER QUESTIONS

Very-short answer questions testing pupil achievement are given here in 4.1 as sample material. Their marking scheme and Question-wise Analysis are given in 4.2 and 4.3 respectively. All questions are one mark each.

2.1 SAMPLE VERY-SHORT ANSWER QUESTIONS

1. Name the Indian scientist who demonstrated sensitivity in plants.
2. Name the machine which has replaced hand stitching.
3. Mention any one device by which you can see very tiny things.
4. How can you make yourself audible in a large gathering?
5. Suppose the paper and printing were not yet developed through science. In such a situation what things could you use to do arithmatical sums?
6. Name the process by which steam changes into water.
7. State any one difference between evaporation and bioling of water.
8. Hydrogen is inflamable and oxygen is a supporter of combustion, while water made up of these two is neither inflammable nor supports combustion. Why?
9. Name the element which is present in sugar and kerosene but not in water
10. Name any four constituents commonly found in air.

11. On the basis of molecules how could you differentiate between pure water and impure water?

12. Name the two methods required for separating the three components of a mixture containing water, mustard oil and sand.

13. A basketful of two materials 'A' and 'B' were separated by winnowing. The heap of 'A' was formed closer to the winnower, whereas that of 'B' was formed a little farther. Why does 'B' form a heap at a small distance away from the heap of 'A'?

14 Name a device which is generally used to measure column of a liquid.

15 Mention the range of markings (in ^{o}C) on a clinical thermometer.

16 Name the phenomenon involved in making wall clocks.

17 Why should you use a measuring tape instead of a wooden metre scale to measure the periphery of a bicycle wheel?

18 How many cm^2 are equal to $10\ m^2$?

19. Mohan's sister was having high fever. He measured her body temperature with a clinical thermometer. He washed the thermometer carefully and put its bulb under his own tongue for about a minute to measure his body temperature. He was surprised to know that the thermometer indicated high fever when he was quite alright. What mistake Mohan might has made in handling the clinical thermometer?

20. One gram of sodium chloride is added to each of the tumblers A and B containing equal amounts of hot and cold water respectively. After sometime, sodium chloride disappeared in tumbler-A, while a small quantity of it was still left in tumbler-B. Why was the interaction greater in A than B ?

21. Give an example of a change while its nature is slow, undesirable, irreversible and chemical.

22. Give two examples of changes which are desirable as well as fast.

23. The earth rotates periodically on its own axis once in 24 hours. What will be the effect on the length of the day if this periodic motion slows down?

24. Give one example of man-made physical change.

25. When you go up on the stairs, where does the energy come from?

26 A solid substance was added in a glass tumbler containing water. Within no time water became hot. Give reason for your answer.

27. A small piece of metal was put into a tumbler containing water. There was a brisk reaction. The piece of metal started floating on the surface of water, and turned into a globule. Explain the cause of the formation of the globule.

28 State oscillatory motion.

29 When a ball is thrown vertically upward, it moves up for some height and then comes down why?

30. Mention any one difference between random motion and linear motion.

31. Mention the life span of a normal lion.

32. If all the animals living in a pond have the same food habit, what would be its effect on their survival?

33. Name one feature which is common to trees and shrubs but it is not found in herbs.

34. Is man herbivorous, carnivorous or omnivorous?

35. Define species in your own words.

36. How many adult elephants will be equal to the weight of a blue whale approximately?

37. Name a tree which remains unbranched normally throughout its life.

38. Arrange the following plants under three categories herbs and shrubs: Radish, canna, jasmine and rose.

39. Name an animal whose body is covered with hairs and can fly to certain extent.

40. Name an animal which is starshaped non-chordate.

41. Mention any two micro organisms.

42. Mention one living largest animal found on land.

43. List two examples of herbs.

44. Mention any two characteristics which are present in stems but not in roots.

45. A child plucked all the flowers of a mustard plant as and when they appeared what would be its effect on the plant?

46. Name any two types of teeth found in the mouth of man which are used for grinding food.

47. During a cycle accident a child lost his four teeth. Now he could not cut and bite apples though he could chew very well. Name the teeth lost.

48 Despite presence of lungs, why should frogs live close to ponds?

49 Name one organ attached to human intestine, which could be removed without any known harmful effect on hea

50 Name the largest knowncell in the animal world.

51 Mention one function of the modified parts of stem in cucumber plant.

52 Name any two functions of leaves.

53 Why are the digits of hind limb of a frog webbed while that of a lizard not?

54 Why are the eggs of most animals larger than their sperms?

55. Mention the name given to the cover of air around the earth.

56 If mud is pasted on the perforations of the cylinder in a wick stove, it stops burning after some time. Explain.

57 Why does the crumbled ball of paper burns only at the edges when you set fire to it while a plain piece of paper burns well? Explain.

58 Mention two main gases found in air.

59 Read carefully each of the following statements. The information provided in the underlined part is wrong. You have to correct it. Mention the correct part of each statement in your answer book alongwith the S.No. of it as well as the Q. Number.

(i) Air helps in drying wet clothes by carrying away water droplets.

(ii) Electric fan circulates air making us feel cool by stopping formation of sweat.

(iii) Bicycle moves slower when its wheels have enough compressed air.

60. Mention any one source of saline water.

61. Mention any two processes through which water is lost from our body.

62 State the meaning of conservation of water in your own words.

63 Define energy in your own words.

64. Which kind of energy is stored in a cracker?

65. Name a source of energy used for turning big turbine

66. Aruna lifts a box weighing 5 Kg to a height of one meter, Vivek lifts another box weighing 2 Kg to the height of two meters. Who does more work?

67. The following organisms are present in an ecosystem
Grass, rabbit, tiger,
Which of them is a producer?

68. If we consider an industrialised city and a remote village, which one will have more polluted air?

69. Name any two omnivorous animals which can fly?

70. Name the missing component from the following energy flow chain.
Sun-goat --Wolf -- Bacteria.

71. Identical quantities of leaves were kept in Delhi in summer and on a hill covered by snow, At which place will the leaves decompose earlier?

72. Suppose you get an opportunity to visit an industrial town and a village far away from it. Which of these two will have less polluted air.

73. Which substance of the green leaves absorbs energy of the sun?

74. Name the missing component in the following energy flow chain.

Sun...... ...> Goat...... ...> Wolf.......... > Bacteria.

75. Define light-year?

76 Define constellations?

77 Mention the reason for appearance of bright streaks of light from a shooting star?

78. During total solar eclipse, some stars can be seen in the sky. Give reason?

2.2 MARKING SCHEME OF VSA QUESTIONS

Q.No. (1)	Value Points (VP) (2)	V.P.wise marks (3)	Total Marks (4)
1	Shri J C Bose	1	1
2	Sewing machine	1	1
3	Microscope	1	1
4	By using Loud Speaker which amplifies the voice	$\frac{1}{2}+\frac{1}{2}$	1
5.	Any one of the following sets:		
	(1) Slate and chalk	1	
	(2) Board, Qalam and Ink (Chalk)	1	
	(3) Blackboard and chalk	1	
	(4) Any other set	1	1
6.	Condensation		
7.	Any one of the following:		
	(1) Evaporation of water takes place on all temperatures while fixed temperatures are required for boiling.	1	
	(2) Evaporation is a slow process while boiling is a quicker process	1	1
8.	Because water is a compound, having properties different from those of its constituent elements.	$\frac{1}{2}+\frac{1}{2}$	1
9.	Carbon	1	1

(1)	(2)	(3)	(4)
10.	Any four of the following (½ for 2 correct ones) (1) Oxygen (2) Nitrogen (3) Carbon dioxide (4) Water vapour (5) dust particles, etc.	½+½	1
11.	Pure water contains only one type of molecules while there are more than one type of molecules in impure water.	1	1
12.	A. Decantration/or filtration B. use of separating funnel	½+½	1
13.	Because 'B' is lighter than 'A' and so wind carries it away	1	1
14.	Measuring cylinder	1	1
15.	35°C - 42°C	1	1
16.	Periodic motion	1	1
17	Because the measuring tape can be bent easily (but not the wooden meter scale)	1	1
18.	1,00,000 (or 10x100x100)	1	1
19.	He did not bring the mercury level below 35°C by giving a jerk to the thermometer 2-3 times	1	1

(1)	(2)	(3)	(4)
20.	Due to the presence of hot water in A, the entire salt dissolves but not so in B due to cold water	$\frac{1}{2}+\frac{1}{2}$	1
21.	Rusting of iron (or any other)	1	1
22.	<u>Any two suitable examples</u> ($\frac{1}{2}$ mark each):		
	(1) burning of coal;		
	(2) taking a photograph;	$\frac{1}{2}+\frac{1}{2}$	1
	(3) any other.		
23.	Duration of day and night will increase	1	1
24.	<u>Any one of the following</u>		
	(1) Ploughing of a field	1	
	(2) Glowing of an electric bulb	1	1
	(3) Any other correct one	1	
25	Body provides the energy	1	1
26	The interaction/change involves release of heat energy	1	1
27	(1) Energy is released as heat; (2) which attacks on the edge of the metal piece that turns into a globule	$\frac{1}{2}+\frac{1}{2}$	1
28.	Oscillatory motion is a motion in which a body shows to-and-fro motion (like a swing).	1	1

(1)	(2)	(3)	(4)
29.	Because of the constant gravitational force acting on the ball	1	1
30.	In random-motion, direction of motion changes irregularly while in linear motion a body moves along a line	1	1
31.	25 years	1	1
32.	Their survival will be threatened	1	1
33.	Hard and woody stem	1	1
34.	Omnivorous	1	1
35.	Similar individuals which interbreeds	1	1
36.	About thirty	1	1
37.	Coconut tree (or any other)	1	1
38.	(1) Herbs: radish and canna	$\frac{1}{2}$	
	(2) Shrubs: jasmine and rose	$\frac{1}{2}$	1
39.	Bat (or any other)	1	1
40.	Starfish	1	1
41.	Any two: Amoeba, Paramecium, Euglena, Bacillus Escherichia, Chlamydomonas, Spirogyra, etc.	$\frac{1}{2}+\frac{1}{2}$	1
42.	Elephant	1	1
43.	Any two: Funaria, Sunflower, etc.	$\frac{1}{2}+\frac{1}{2}$	1

(1)	(2)	(3)	(4)
44.	Any two ($\frac{1}{2}$ mark each):		
	(1) Presence of nodes,		
	(2) Presence of internodes,	$\frac{1}{2}$x2	
	(3) Presence of leaves,		
	(4) Any other		1
45	The plant will not bear fruits/seeds.	1	1
46.	(1) Molar and (2) Premolar	$\frac{1}{2}+\frac{1}{2}$	1
47	Incisors	1	1
48	To moisten skin for cutaneous respiration	$\frac{1}{2}+\frac{1}{2}$	1
49	Appendix	1	1
50.	Egg or Ostrich	1	1
51	Climbing	1	1
52	Any two: Photosynthesis, respiration, transpiration	$\frac{1}{2}+\frac{1}{2}$	1
53	Because frogs swim in water for which webbed feet are suitable; Lizards do not swim and so do not need	$\frac{1}{2}+\frac{1}{2}$	1
54.	Because egg contain food for growing embryo (or young one)	$\frac{1}{2}+\frac{1}{2}$	1
55	Atmosphere	1	1
56.	It does not get air (or oxygen) for burning	$\frac{1}{2}+\frac{1}{2}$	1
57.	Crumpled ball gets less air (or O_2) for burning than the plain piece.	$\frac{1}{2}+\frac{1}{2}$	1

(1)	(2)	(3)	(4)
58.	Any two of the following:		
	(1) Oxygen, (2) Nitrogen, (3) Any other	$\frac{1}{2}+\frac{1}{2}$	1
59.	(1) Through evaporation of water	1	
	(2) By rapid evaporation of sweat	1	
	(3) Its wheels do not have enough compressed air	1	3
60.	Sea water (or any other correct source)	1	1
61.	Any two:		
	(1) Exhalation, (2) Sweating, (3) Urination	$\frac{1}{2}+\frac{1}{2}$	1
62	It means careful and economic use of water.	$\frac{1}{2}+\frac{1}{2}$	1
63	The ability to do work is called energy	1	1
64	Chemical energy	1	1
65	Running water (or steam)	1	1
66.	Aruna	1	1
67.	Grass	1	1
68.	Industrialised city	1	1
69.	Any two:		
	(1) Sparrow (2) Crow (3) Any other	$\frac{1}{2}+\frac{1}{2}$	1
70.	Green plants	1	1
71.	Leaves stored in Delhi's summer	1	1
72.	Village air will be less polluted	1	1
73.	Chlorophyll	1	1
74.	Green plants (after the sun)	1	1

(1)	(2)	(3)
75.	Dista-nce travelled by light in one year is called one light year.	1
76.	Groups of stars having recognisable shapes are called constellations.	1
77.	Due to friction of air in atmosphere meteorites burn and glow	1
78.	Due to dim light	1

2.3 QUESTION-WISE ANALYSIS OF VSA QUESTIONS

Q. No.	Objective	Specification	Unit Number	Form of question	Marks	Time (Minute)	Difficulty level
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	K	Recalls	1.3	VSA	1	1	C
2	K	Recalls	1.1	VSA	1	1	B
3	K	Recalls	1.3	VSA	1	1	C
4	U	Identifies relationship	1.1	VSA	1	1	B
5	A	Predicts	1.1	VSA	1	1	A
6	K	Recalls	2.2	VSA	1	½	C
7	U	Compares	2.2	VSA	1	1	B
8	U	Explains	2.2	VSA	1	1½	A
9	A	Analyses	2.3	VSA	1	1	A
10	K	Recalls	3.1	VSA	1	1	C
11	U	Compares	3.1	VSA	1	1	B
12	U	Identifies relationship	3.[illegible]	VSA	1	1	B
13	A	given reasons	3.2	VSA	1	1	A
14	K	Recalls	4.4	VSA	1	1	C
15	K	Recalls	4.6	VSA	1	1	C
16	K	Recalls	4.7	VSA	1	1	C
17	U	Explains	4.2	VSA	1	1	B
18	U	Translates	4.3	VSA	1	1	B
19	A	Analyses	4.[illegible]	VSA	1	1	A
20	A	Give reason	5	VSA	1	2	A
21	U	Cites example	5	VSA	1	1	B
22	U	Cites examples	5	VSA	1	1	B

(1)	(2)	(3)	(4)	(5)	(6)	(7)
23	A	Analyses	5	VSA	1	1
24	U	Cites examples	5.1	VSA	1	1
25	U	Explains	5.3	VSA	1	1
26	A	Give reason	5.3	VSA	1	1
27	A	Establishes cause and effect.	5	VSA	1	2
28	K	Recalls	6.1	VSA	1	1
29	U	Explains	6.2	VSA	1	1
30	U	Compares	6.1	VSA	1	1
31	K	Recalls	7.2	VSA	1	1
32	A	Predicts	7.1	VSA	1	2
33	A	Analyses	7.3	VSA	1	2
34	K	Recalls	7.1	VSA	1	1
35	K	Recalls	7.2	VSA	1	1
36	K	Recalls	7.1	VSA	1	1
37	U	Cites examples	7.1	VSA	1	1
38	U	Classifies	7.3	VSA	1	1
39	U	Cites examples	7.5	VSA	1	1
40	K	Recalls	7.3	VSA	1	1
41	K	Recalls	7.1	VSA	1	1
42	K	Recalls	7.1	VSA	1	1
43	U	Relates	7.1	VSA	1	1
44	U	Compares	8.1	VSA	1	1
45	A	Predicts	8.2	VSA	1	1
46	U	Classifies	8.2	VSA	1	1
47	A	Infers	8.2	VSA	1	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
48	U	Explains	8.1	VSA	1	1	B
49	K	Recalls	8.2	VSA	1	1	C
50	K	Recalls	8.2	VSA	1	1	C
51	U	Identifies relationship	8.1	VSA	1	1	B
52	K	Recalls	8.1	VSA	1	1	C
53	U	Compares	8.2	VSA	1	1	B
54	U	Explains	8.2	VSA	1	1	B
55	K	Recalls	9.1	VSA	1	1	C
56	U	Explains	9.2	VSA	1	1	B
57	U	Compares	9.3	VSA	1	2	E
58	K	Recalls	9.2	VSA	1	1	C
59	U	Rectifies mistakes	9.4	VSA	1x3	3	B
60	K	Recalls	10.2	VSA	1	1	C
61	K	Recalls	10.6	VSA	1	1	C
62	U	Translates	10.7	VSA	1	1	B
63	U	Translates	11.1	VSA	1	1	B
64	K	Recalls	11.2	VSA	1	1	C
65	K	Recalls	11.3	VSA	1	1	C
66	A	Infers	11.1	VSA	1	1	A
67	K	Recalls	12.2	VSA	1	1	C
68	K	Recalls	12.3	VSA	1	1	C
69	U	Compares	12.1	VSA	1	1	B
70	U	Detects error	12.2	VSA	1	1	B

(1)	(2)	(3)	(4)	(5)	(6)	(7)
71	A	Analyses	12.2	VSA	1	1
72	A	Infers	13.3	VSA	1	[illegible]
73	K	Recalls	12.2	VSA	1	1
74	U	Detects error	12.2	VSA	1	1
75	K	Recalls	13.1	VSA	1	1
76	K	Recalls	13.2	VSA	1	1
77	U	Explains	1[illegible].3	VSA	1	1
78	[illegible]	Gives reason	13.1	VSA	1	1

THREE

SHORT ANSWER QUESTIONS

Short-answer questions testing pupil achievement are constructed and given here as sample questions in 3.1 along with their marking scheme and question-wise analysis in 3.2 and 3.3 respectively. All questions are 2 marks each.

3.1 SAMPLE SHORT ANSWER QUESTIONS

1. Explain how science has proved advantageous with regard to fast travel.
2. How would you locate the fault when your bicycle makes a harsh sound on paddling?
3. Mention the work of Nagarjuna for which Indians remember him.
4. Suppose several factories are installed in your area. How would these affect plants, animals and people adversely?
5. A torch was working perfectly. After a month, its owner switched it on but it did not work. Mention any four faults which could have occurred in the torch making it out of order.
6. Mention any two modes of land transport and explain how these have made our journey for long distances faster and comfortable.
7. State any two properties of metals.
8. State any two properties which are common in all the three states of matter.

9. Below are given four groups having English letters. Each letter represents an object.

Group 1: A, B, C, D, E, F

Group 2: B, B, B, B, B, B

Group 3: M, L, K, L, K, M

Group 4: G, I, H, J, N, O

A boy on examining the groups concludes that out of the four only one group can be further classified. Name that group giving reasons for justifying the conclusion of the boy.

10. With the help of three diagrams show the difference in arrangement of molecules in ice, water and steam (use 12 small circles for each diagram representing 12 molecules. Change the size of the diagram where necessary).

11 State two conditions necessary for separating two components of a mixture by sieving.

12. State the procedure for separating sugar from a mixture of sand and sugar in the laboratory.

13. Why method of centrifugation and not filtration is employed in separating cream from milk? Explain.

14. Mohan wanted a sample of pure sugar. He used the method of crystallization instead of vaporization. Justify his choice.

15. By mistake common salt powder and naphthalene powder got mixed up. Suggest a method to separate them.

16 During a dust storm, it was not possible to see an object even at a distance of about 5m. After few minutes, it started raining and when the rain just stopped, the objects were clearly visible even placed at a distance of 50m. Explain.

17. With the help of an example, state the principle on which the process of sieving is based.

18 You have to measure length of an object using a metre scale. State any two precautions which you would take in the measurement.

19 For measuring time of sport events instead of an ordinary watch a stop watch is used. Why?

20. A shopkeeper gets the handle of his beam balance welded with the beam. State how this action of the shopkeeper helps him in cheating the customers?

21. Give two examples of changes in which there is an interaction, working from a distance.

22. Explain why cutting of trees may be desirable for some and undesirable for others.

23. Tumblers 'A' and 'B' contain equal amount of hot and cold water respectively. 10 grams of a solid substance is added to each tumbler separately but at the same time. After 5 minutes the substance disappeared in tumbler 'A' while it was still left out almost half in tumbler 'B'.

Assign reason for this faster change in 'A' than 'B'.

24. You are given three materials --- (1) plastic comb (2) dry hairs, and (3) small bits of paper. Use these materials to illustrate
(1) interaction at a distance, and
(2) interaction in contact.

25. The earth moves round the sun in one year. The motion is periodic. Given two effects if the motion of the earth becomes non-periodic.

26. Mohan adds a spoon of table salt (sodium chloride) in a glass of water, it starts disappearing slowly and slowly. He then, stirs the water with a spoon, the table salt starts disappearing rapidly. Explain these observations in terms of interaction.

27. Explain with the help of two examples how interaction takes place between two substances when they come in close contact.

28. With the help of a plastic comb and few small pieces of paper how would you demonstrate electrostatic force?

29. A boy travels a distance of 1.2 Km in 20 minutes. What is the speed of the boy in meters per second?

30 State the condition under which a force acting on a moving body (1) increases and (2) decreases its speed.

31 When you walk on an oily cemented floor, there are changes that you might slip. Why?

32. Bat can fly like a bird but it is not classified under birds, Why? Give two reasons.

33. Write any two similarities between living organisms and non-living objects.

34. Sta-te any four aspects in which individuals of a species are similar to each other.

35. State the procedure for making a slide of human cheek cells for microscopic observation.

36. Draw a labelled diagram showing two or more cells of onion peel.

37. State any two functions of stems which are usually performed by them.

38 Mohan mixed some powdered chillies and common salt in lemon juice. He put a drop of this mixture each on the tip of the tongues of his five friends. All of them tasted it salty. None of them could detect "burning" and sour tastes during this experiment. What generalization could you draw on the basis of this data?

39. Give diagrams of molar and premolar teeth to show differences in their size and shape.

40. Mention any four externally visible differences between root and stem.

41 Describe an experiment to show that an empty glass bottle contains air.

42. Sometimes when air is filled in a tube of a bicycle with a bicycle pump, it bursts. Give two possible reasons.

43. Why are there holes around the bottom and the top of a kerosene lantern. Give reasons.

44. Why are factories usually set up outside the township? Mention two reasons.

45. Explain how windmills can be used to generate electricity.

46. State any four ways by which pollution of river water can be prevented.

47. Hard water is never used in steam engines, Why? Give reason.

48. Draw a labelled diagram of the apparatus used for determining the boiling point of water.

49. Describe an activity to show that water is essential for the germination of gram seeds.

50. Explain how the river water, polluted by direct disposal of sewage and industrial wastes affects the health of [illegible] it is used for [illegible]

51. Ramesh collected rain water in two test-tubes 'A' and 'B'. He added a small quantity of soap in test tube 'A'. After shaking the test tube, he got a good lather in it. In test-tube 'B', he first dissolved a pinch of magnesium sulphate and then added a little quantity of soap. After shaking this test-tube, he found much less lather than that of the test-tube 'A'.

Give conclusions which you would draw on the basis of this experiment.

52. Draw a labelled diagram of the apparatus used for determining the melting point of ice.

53 State two factors on which the work done by a force depends.

54 Coal is said to be a fossil fuel. Why?

55 Why does a catapult throws away a small stone to a large distance?

56 A student drops a stone from a height of 1m. Another student drops the same stone from a height of 2m. It is found that in the second case the stone does more work. Now state the conclusion you can draw from this activity.

57. Define the terms consumer and producers giving an example of each.

58 Draw graphically a food chain involving lions, bacteria, grasses and rabbits and mention which of them is the primary consumer and why?

59. How do flowers help honey bee to produce honey?

60. How does nectar help in the transference of pollen grains from one plant to the other.

61. Draw graphically a food chain involving peacock, snake, rat and wheat, and explain how the population of rats are controlled there.

62. State any two characteristics of a constellation.

63. State two differences between a star and a planet.

64. On a clear night sky a person was left aone in the desert. If he wants to go towards east, how he will find the direction?

65. Draw and show the position of various stars in the constellation named "Orion".

continued

Q.No. (1)	Value Points (VP) (2)	V.P. wise marks (3)	Total Marks (4)
1.	Any two of the following:		
	A. Man used horse cart (or bullock cart) in earlier times which was later replaced by motor car or Bus invented by scientists.	1	
	B. To travel faster, trains were invented which not only move faster but also carry more people.	1	
	C. Aeroplanes in air or steamer on sea were invented to move people still faster.	1	2
2.	A. Observes to find out the part that was making that sound	1	
	B. Observes more closely to decide why it is making that sound	1	2
3.	A. Nagarjuna discovered methods of curing diseases.	1	
	B. This method of treatment is called Ayurveda and is still practiced in India.	1	2
4.	A. Factories emit smoke and harmful gases in the air.	½	
	B. This makes air impure. Impure air harms plants, animals and man.	½	

(1)	(2)	(3)	(4)
	C. Waste products of factories include harmful chemicals which are released into rivers or ponds.	½	
	D This makes water impure. The impure water harms plants, animals and people.	½	2
5.	Any four of the following (½ mark each):		
	A. Bulb of the torch was fused (or removed);		
	B. Cells were exhausted (or removed);		
	C. The connection between cells and bulb was broken (or became loose);	½x4	
	D. Cells were placed wrongly (or their polarity was changed);		
	E. Any other.		2
6.	A. Motor car or buses: We can travel faster and conveniently for longer distances than a horse cart because the average speed can be maintained 50 km/h; the seating arrangement is also suitable for sitting.	½+½	
	B. Trains connects cities from one corner of the country to another moving much faster, i.e. at an average speed of 80 km/h;; many people can travel together, sitting/sleeping comfortably; water and food arrangements	½+½	

(1)	(2)	(3)	(4)
	C. Any other	½+½	2
7.	Any two		
	A. Metals are good conductors of heat and electricity	1	
	B. Metals have lustre	1	
	C. Metals are generally solids	1	2
8.	Any two of the following:		
	A. All (solid, Liquids, Gas) have mass	1	
	B. All occupy space	1	
	C. All are made up of molecules	1	2
9.	A. Group No. 3	1	
	B. Because in this group all objects are neither similar nor different	1	2
10.	Student is expected to draw following three diagrams:		
	A. Diagram showing arrangement of molecules in ice by 12 circles closely packed together in 2-3 lines		
	B. Diagram showing arrangement of molecules in water by 12 circles arranged in 2-3 lines with more space in between the circles.		
	C. Diagram showing arrangement of molecules in steam by 12 circles scattered here and there and		

(1)	(2)	(3)	(4)
	occupying much more place than water.		
	Marking scheme: If only one diagram is correct give $\frac{1}{2}$ marks. If two diagrams are correct give 1 mark. If all the three diagrams are correct give 2 marks.		2
11.	Basic condition:		
	A. Both the components should be solid and one should be smaller than the other in size	$\frac{1}{2}+\frac{1}{2}$	
	B. Size of the holes in the sieve should be more than that of the small sized component but less than that of the other component.	$\frac{1}{2}+\frac{1}{2}$	2
12.	A. Taking the mixture in a beaker and adding enough water to dissolve the sugar	$\frac{1}{2}$	
	B. Stirring it well with a glass rod till all sugar dissolves.	$\frac{1}{2}$	
	C. Filter it through a funnel	$\frac{1}{2}$	
	D. Evaporate the filterate to dryness in a porcelain dish to recover sugar	$\frac{1}{2}$	2
13.	A. Cream is suspended in the milk as fine particles and so cannot be separated by filtration; the size of the cream particles is much smaller than that of pores of the filter paper.	$\frac{1}{2}+\frac{1}{2}$	

(1)	(2)	(3)	(4)
	B. On centrifugation these fine particles being lighter than other substances of the milk move towards the top and join together to form cream, and thus can be taken out of the milk.	$\frac{1}{2}+\frac{1}{2}$	2
14.	A. Evaporation method would leave impurities alongwith sugar.	1	
	B. In the case of crystallization method, crystals of pure sugar will separate out leaving the impurities in the solution.	1	2
15.	Shake the mixture with water for some time. Common salt dissolves while naphthalene remains insoluble. Water solution is evaporated to obtain solid common salt.	1+1	
	OR		
	Napthalene can be separated by sublimation process (Discription of this process is needed).	1+1	2
16.	A. Presence of dust particles in air during the dust storm causes poor visibility.	$\frac{1}{2}$	
	B. During the rain, the dust particles are loaded by the rain drops and hence settles down.	$\frac{1}{2}+\frac{1}{2}$	

(1)	(2)	(3)	(4)
	C. Removal of dust particles increases the visibility and so objects placed at a distance of 50m become visible.	½	2
17.	A. The basic principle involved in sieving is the separation of two solids having different sizes with the help of a sieve.	½	
	B. The size of the holes of a sieve should be more than that of the smaller particles but less than that of the bigger particles.	½	
	C. For example, wheat flour is separated from its husk using a sieve having holes larger than the size of flour particles.	½	
	D. On sieving, wheat flour passes through the holes of the sieve and thus gets separated. The husk having larger size than that of the pore remains in the sieve.(or any other example)	½	2
18.	A. The scale should be placed along the length to be measured.	1	
	B. Eye must be kept exactly above the point where the measurement is to be taken.	1	2

(1)	(2)	(3)	(4)
19.	A. Unlike ordinary watches stop watch can be started and stopped when desired.	1	
	B. Thus the time taken by a sports event is accurately read. This is not so with ordinary watches as time consumed during reading the watch is also added.	1	2
20.	A. By welding the handle with the beam, the shopkeeper is able to manipulate the beam according to his own wishes.	1	
	B. Thus he can easily cheat the customers by under-weighing as the beam would not move freely on the central axis.	1	2
21.	Any two examples		
	A. A magnet attracting iron fillings.	1	
	B. A plastic comb rubbed against dry hair attracting small bits of paper.	1	
	C. Sparking between the ends of wires carrying high voltage current, when the ends are brought closer.	1	
	D. Or, other correct example.	1	2
	A. Cutting of tree is desirable for those who need to use it as fuel	1	

(1)	(2)		(3)	(4)
	B.	But it is undesirable for those who intend to maintain forests in order to keep balance in nature	1	2
23.	A.	Due to hot water, there is greater interation in 'A' than in 'B'.	1	
	B.	Due to greater interaction, the rate of change increases and so the change is faster in 'A' than in 'B'	1	2
24.	A.	The plastic comb attracts small bits of paper when it has been rubbed previously with dry hairs. The attraction of paper by comb illustrates (a) interaction at a distance.	1	
	B.	The rubbing of the comb with dry hair illustrates (b) interaction in contact.	1	2
25.	A.	It would be difficult to predict the onset of season.	1	
	B.	It would be difficult to predict the eclipses the moon and sun in advance.	1	2
26.	A.	Table salt and water interact when they come in contact.	½	

(1)	(2)			(3)	(4)
	B.	Due to this interactions, table salt starts dissolving slowly and slowly in water (which appears as slow dis-appearance of sugar).		½	
	C.	Stirring of water increases inter-action between table salt and water		½	
	D.	Increase in interaction also increases the rate of change and so table salt starts dissolving rapidly.		½	2
27.	Any two examples.				
	A.	(i)	During sharpening of a pencil pencil comes in contact with blade. The both interact (or act on each other).	½	
		(ii)	Due to this interaction, pencil is sharpened, blade's edge got blunt.	½	
	B.	(i)	During striking a match stick on the side of a match box, the two interact.	½	
		(ii)	As a result of this inter-action match-stick is ignited while the side of match-box gets scratched.	½	2
	C.	Any other example(s)		½	

(1)	(2)		(3)	(4)
28.	A.	Rubbing the body of the comb into dry hair	$\frac{1}{2}$	
	B.	Bringing the rubbed comb near the tiny pieces of papers;	$\frac{1}{2}$	
	C.	Pieces of paper are attracted towards the comb;	$\frac{1}{2}$	
	D.	Attraction is due to an electrostatic force exerted by the rubbed comb.	$\frac{1}{2}$	2
29.	A.	$\frac{\text{Distance}}{\text{time}} = \frac{1.2 \times 1000 M}{20 \times 60 s} = \frac{1200 M}{1200 s}$	1	
	B.	$1\ ms^{-1}$ or 1 metre per second	1	2
30.	A.	On applying force in the direction of motion, the speed of the ball increases.	1	
	B.	On applying force in the direction of motion the speed of the moving ball decreases.	1	2
31.	A.	Presence of oil on a cemented floor makes it smooth. Smooth surfaces have less friction.	1	
	B.	When the friction between foot and floor decreases chances of slipping increases.	$\frac{1}{2}+\frac{1}{2}$	2

(1)	(2)	(3)	(4)
32.	Due to any two:		
	A. Presence of (Any two);		
	(i) hairs		
	(ii) external ears,		
	(iii) mammary glands		
	(iv) viviparous teeth	$\frac{1}{2}+\frac{1}{2}$	
	B. Absence of (any two)		
	(i) feathers		
	(ii) beak		
	(iii) egg laying	$\frac{1}{2}+\frac{1}{2}$	2
33.	A. All living and non-living objects are madeup of matter	1	
	B. They all have mass or occupy space.	1	2
34.	A. Body parts and their functioning are similar.	$\frac{1}{2}$	
	B. They eat some kind of food	$\frac{1}{2}$	
	C. They live in the same type of habitat	$\frac{1}{2}$	
	D. They cooperate among themselves for reproduction.	$\frac{1}{2}$	
35.	A. To take a scraping from inner surface of the cheek.	$\frac{1}{2}$	
	B. To place the scraping on a glass slide.	$\frac{1}{2}$	
	C. To add a drop of water on the scraping	$\frac{1}{2}$	

(1)	(2)	(3)	(4)
	D. Placing a cover slip on it.	½	2
	(The slid is ready for microscopic observation).		
36.	Diagram showing the following parts – correctly drawn and labelled (any four parts).		
	A. Cell wall	½	
	B. Nucleus	½	
	C. Cytoplasm	½	
	D. Vacuole	½	
	E. Cell membrane	½	
	F. any other part	½	
37.	Any two of the following.		
	A. Stems carry water (and mineral salt) to leaves and flowers.	1	
	B. Stems carry food from leaves to other parts of the plant (e.g. roots, flowers and fruits).	1	
	C. Stems hold the leaves in such a manner that the leaves get plenty of light from sun.	1	
	D. Stems hold flowers and fruits.	1	2
38.	A. Tip of the tongue can sense salty taste	1	
	B. But fails to detect the sour and bitter tastes.	1	2

(1)	(2)	(3)	(4)
39.	A. Diagram of molar tooth showing:		
	(i) wider diameter	½	
	(ii) branched base	½	
	B. Diagram of premolar tooth showing:		
	(i) less diameter	½	
	(ii) unbranched base	½	2
40.	Any four of the following		
	Root / **Stem**		
	(i) Non-green in colour. / (i) Green in colour	½	
	(ii) Root cap present / (ii) No root cap	½	
	(iii) No nodes and internodes. / (iii) Nodes and internodes present	½	
	(iv) No axillary buds. / (iv) Axillary buds present	½	
	(v) Grows towards the earth / (v) Grows away from the earth	½	
	(vi) Grows away from sunlight / (vi) Grows towards sun light	½	2
41.	A. Introduce the glass bottle into the water in an inverted position; water does not enter the bottle showing that bottle is filled with air.	1	

(1)	(2)		(3)	(4)
	B.	Fill the inverted bottle slightly; water starts entering and bubbles of air escape.	1	2
42.	A.	There may be a cut in the bicycle tyre and so the tube is not able to sustain force of compressed air.	1	
	B.	Too much air is compressed in the cycle tube and so the tube and tyre are not able to sustain this force of compressed air.	1	2
43.	A.	Bottom holes are for the entry of fresh air to supply oxygen for burning the kerosene.	1	
	B.	Top holes are for the exit of the products of burning and unused hot air.	1	2
44.	A.	To avoid pollution of air of the township	1	
	B.	Availability of more space for expansion of factories.	1	2
45.	A.	The wind mill is connected to a coil in a magnetic-field through a shaft	$\frac{1}{2}+\frac{1}{2}$	
	B.	When the wheel rotates, it makes the coil rotate; thus generating electricity	$\frac{1}{2}+\frac{1}{2}$	2

(1)	(2)	(3)	(4)
46.	Any four of the following		
	A. Avoiding throwing domestic waste (garbage) into rivers	$\frac{1}{2}$	
	B. Avoiding direct disposal of sewerage into river water	$\frac{1}{2}$	
	C. Avoiding direct disposal of industrial wastes.	$\frac{1}{2}$	
	D. Avoiding cleaning utensils or washing clothes near the river	$\frac{1}{2}$	
	E. Any other	$\frac{1}{2}$	2
47.	A. If hard water is used in the boilers of steam engines, a thick coat of the Ca and Mg salts is formed on inner walls.	$\frac{1}{2}$	
	B. This layer is a poor conductor of heat and as such much fuel is wasted.	$\frac{1}{2}$	
	C. Thick coat of salts corrodes the metal too.	$\frac{1}{2}$	
	D. The boiler gets spoiled very soon	$\frac{1}{2}$	2
48.	The following parts correctly drawn and labelled:		
	A. Boiling tube (fixed to the stand vertically).	$\frac{1}{2}$	
	B. Water (in the boiling tube about $\frac{1}{3}$)	$\frac{1}{2}$	

(1)	(2)	(3)	(4)
	C. Thermometer (placed vertically inserted in the tube with its bulb just above the water.)	½	
	D. Steam (Produced on heating the boiling tube with a spirit lamp or burner).	½	2
49.	A. Taking gram seeds in two samples 'A' and 'B'	½	
	B. Soaking the seeds of sample 'A' in water for a few hours and leaving sample 'B' dry.	½	
	C. Keeping soaked seeds in a wet cloth for a few days	½	
	D. Observing both samples; seeds of sample 'A' germinate while that of 'B' do not.	½	2
50.	A. Sewage water contains germs of certain water-borne diseases (e.g. diarrhoea, typhoid, cholera, etc) which get into water. On drinking this water it may cause diseases to us.	1	
	B. Industrial wastes contain certain harmful chemicals which get dissolved in river water. On consumption of such water, our health is affected adversely.	1	2

(1)	(2)		(3)	(4)
51.	A.	Rain water sample 'A' is soft water	1	
	B.	Rain water becomes hard in sample 'B' in presence of Magnesium Sulphate	1	2
52		Any four parts out of the following labelled correctly (½ mark each):		
	A.	Funnel (fixed to the stand)	½	
	B.	Ice (filled in the funnel)	½	
	C.	Thermometer (with its bulb covered by ice).	½	
	D.	Water (collected in a beaker)	½	2
	E.	Drops of water (coming out of the stem of funnel as ince starts melting.	½	
53.		The mechanical work done by a force depends on the following two factors:		
	A.	The distance through which the point of application of the force move	1	
	B.	The magnitude of force applied to move the body	1	2
54.	A.	Coal is formed after millions of years from the trees which got buried under the earth. Thus coal is a fossil.	1	
	B.	On burning, it provides heat and light energy and thus it is a fuel. Thus, coal is a fossil fuel.	1	2

(1)	(2)	(3)	(4)
55.	A. When the rubber of a catapult with a stone in it is stretched, it stores mechanical energy.	1	
	B. On releasing the rubber, its mechanical energy moves away the stone with a high speed and the stone covers a large distance.	1	2
56.	A body which is raised higher above the ground possesses greater energy, and so	1	
	it is capable of doing greater work.	1	2
57.	A. Those organisms which take their nourishment from plants or other animals are termed as consumer;	$\frac{1}{2}$	
	example: Goat or lion or any other	$\frac{1}{2}$	
	B. Those which prepare their own food with the help of sunlight are termed as producers.	$\frac{1}{2}$	
	Example: Green plants or name of any plant.	$\frac{1}{2}$	2
58.	A. Grasses ------> Rabbits ----> Lions -------> Bacteria.	$\frac{1}{2}+\frac{1}{2}$	
	B. Primary consumer is the rabbit because it eats grasses, the green plants.	$\frac{1}{2}+\frac{1}{2}$	2

(1)	(2)	(3)	(4)
59.	A. Many flowers have nectar glands at their bases. These glands produces nectar.	$\frac{1}{2}+\frac{1}{2}$	
	B. Honey bee collects nectar from the flower and prepares honey.	$\frac{1}{2}+\frac{1}{2}$	2
60.	A. When the insects come in search of nectar to the flower, the pollen grain from the stamens get attached to their legs and body.	$\frac{1}{2}+\frac{1}{2}$	
	B. The same insect when visits the flower of another plant in search of nectar the pollen grains fall onthe stigma of this flower from the insects body	$\frac{1}{2}+\frac{1}{2}$	2
61.	A. Food chain Wheat ⟶ Rat ⟶ Snake ⟶ Peacock.	$\frac{1}{2}+\frac{1}{2}$	
	B. In the field, the population of rats is controlled by snakes which eat them.	$\frac{1}{2}+\frac{1}{2}$	2
62.	Any two of the following		
	A. It is a group of stars having a recognisable shape.	1	
	B. Shape of a constellation always remains the same.		
	C. All the stars of a constellation always remain together.	1	2

(1)	(2)	(3)	(4)
63.	Any two of the following. Star / Planet		
	A. Star: It is fixed — Planet: It revolves around a star in fixed orbits.	$\frac{1}{2}+\frac{1}{2}$	
	B. Star: Star shines by light of their own. — Planet: Planets do not have light of their own. They shine with light from the sun.	$\frac{1}{2}+\frac{1}{2}$	
	C. Star: Stars twinkle — Planet: Planets do not twinkle	1	
	D. Star: Any other — Planet: Any other	1	2
64.	A. He will locate star with the help of sapta-rishi	$\frac{1}{2}$	
	B. He will then stand facing towards it.	$\frac{1}{2}$	
	C. His right hand side would indicate the east.	$\frac{1}{2}$	
	D. So he will turn to his right side to go towards east.	$\frac{1}{2}$	2
65.	A. Overall recognizable shape.	$\frac{1}{2}$	
	B. Bright stars of the belt;	$\frac{1}{2}$	
	C. Less bright stars of sword;	$\frac{1}{2}$	
	D. Correct position of other stars.	$\frac{1}{2}$	2

continued

QUESTION-WISE ANALYSIS OF S A QUESTIONS

Objective.	Specification	Unit number	Form of question.	Marks allotted.	Estimated time.	Estimated difficulty level.
(2)	(3)	(4)	(5)	(6)	(7)	(8)
U	Explains	1.1	SA	2	4	B
U	Relates	1.2	SA	2	5	B
K	Recalls	1.3	SA	2	4	C
A	Analyses	1.3	SA	[illegible]	5	D
A	Predicts	1.2	SA	2	5	A
U	Explains	1.1	SA	2	5	B
K	Recalls	2.1	SA	2	4	C
U	Compares	2.2	SA	2	4	B
A	Judges	2.3	SA	2	4	A
S	Draws and labels	2.4	SA	2	5	A
K	Recalls	3.1	SA	2	4	C
K	Recalls	3.2	SA	2	5	C
U	Explains	3.2	SA	2	5	B
A	Judges	3.3	SA	2	5	A
A	Suggest a procedure	3.3	SA	2	[illegible]	A
A	Gives reason	3.1	SA	2	5	A
K	Recalls	4.2	SA	2	4	C
K	Recalls	4.2	SA	2	4	C
U	Explains	4.7	SA	2	4	B
A	Analyses	4.5	SA	2	4	A

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
21.	K	Recalls	5.2	SA	2	4	C
22	K	Recalls	5.1	SA	2	4	C
23	A	Gives reason	5.2	SA	2	5	A
24	U	Relates	5.4	SA	2	5	B
25	A	Establishes relationship	5.1	SA	2	5	A
26	U	Explains	5.2	SA	2	5	A
27	U	Explains	5.3	SA	2	5	B
28	K	Recalls	6.2	SA	2	5	C
29	U	Calculates	6.1	SA	2	5	B
30	U	Explains	6.2	SA	2	5	B
31	A	Gives reason	6.2	SA	2	5	A
32	U	Explains	7.2	SA	2	5	B
33	U	Relates	7.2	SA	2	5	B
34	K	Recalls	7.1	SA	2	4	C
35	U	Explains	7.2	SA	2	4	B
36	S	Draws and labels	7.2	SA	2	5	B
37	K	Recalls	8.1	SA	2	4	C
38	A	Generalises	8.2	SA	2	5	A
39	S	Draws	8.2	SA	2	4	B
40	U	Compares	8.1	SA	2	5	B
41	K	Recalls	9.1	SA	2	5	C
42	A	Gives reason	9.1	SA	2	5	A
43	A	Gives reasons	9.4	SA	2	5	A
44	U	Extrapolates	9.4	SA	2	4	B
45	U	Interprets	9.3	SA	2	5	B

(2)	(3)	(4)	(5)	(6)	(7)	(8)
K	Recalls	10.7	SA	2	4	C
A	Gives reason	10.1	SA	2	5	A
S	Draws and labels	10.3	SA	2	5	B
K	Recalls	10.1	SA	2	5	C
U	Explains	10.7	SA	2	5	B
A	Infers	10.5	SA	2	5	A
S	Draws and lables	10.3	SA	2	5	B
K	Recalls	11.1	SA	2	4	C
K	Recalls	11.3	SA	2	4	C
U	Explains	11.2	SA	2	5	B
A	Analyses	11.1	SA	2	5	A
K	Recalls	12.1	SA	2	4	C
U	Translates	12.2	SA	2	5	B
U	Relates	12.2	SA	2	4	B
U	Interpret	12.3	SA	2	5	B
A	Analyses	12.2	SA	2	5	B A
K	Recalls	13.2	SA	2	4	C
U	Compares	13.3	SA	2	5	B
A	Establishes relationship	13.2	SA	2	5	A
S	Draws and labels	13.2	SA	2	5	B

FOUR

LONG ANSWER QUESTIONS

Long-answer (or essay) questions are given here in 4.1 along with their marking-scheme and question-wise analysis in 4.2 and 4.3 respectively. Each question is of 4 marks.

4.1 SAMPLE LONG ANSWER QUESTIONS

1. State the basic steps of the method used by scientists.
2. Based on daily life uses, mention along with the uses, any four examples of application of science.
3. Mohan was complaining pain in his abdomen. His family doctor after having him examined, gave medicines and also asked for his stool test and then meeting him again. How was the doctor acting as a scientist in finding out the cause of Mohan's illness? Explain.
4. Write different steps of deciding whether a material is soluble in water or not? Name two other methods of classifying materials.
5. Give an example to show that the properties of a compound are different from that of the elements from which it is made up of.
6. With the help of a labelled diagram describe the procedure of obtaining distilled water from the tap water. No description for the setting of apparatus is required.
7. You are given a mixture of iron filings sulphur powder and sugar. Describe the methods you will use in separating them.

8. A cubical glass slab of side 3 cm is given to you Calculate its volume and verify your result with the help of a graduated cylinder.

9. List any two precautions you take before using a clinical thermometer. Mention its range in celsius scale and explain why this range is kept so small?

10. Give four examples of physica-l changes involving absorption of heat energy.

11. A teacher while teaching in the class-room lights the candle and lowers down in a gas jar. Describe the changes in four steps that occur during this process and identify them as chemical or physica-l change.

12. Describe any four experiments to show that heat energy is absorbed during a physical change. Give reasons.

13. Observe a burning candle and record any four observa-tions. Identify them as physical or chemical change.

14. When does a body is said to be in motion? Give one example of the following types of motion you observe in a bicycle moving with auniform speed;
    (i) linear, (ii) periodic, and (iii) circular.

15. Draw diagrams to show the position of fulcrum, effort and load in following situations.
    (i) A man lifting a load with the help of a rod;
    (ii) A man carrying load on a wheel barrow;
    (iii) A man opening the door of a room.
    (iv) A boy using a fishing rod.

16. State four differences between mango plant and cow in a tabular form with regard to movement, food, growth and reproduction.

17. Describe any four differences between plants and animals.

18. Describe the process of breathing in man (No diagram is required).

19. Name any four plants where the stem is modified and mention the function performed by the modified stem in each case.

20. Draw a labelled diagram of the human digestive system including salivary glands, pancues and liver. (No description is required).

21. Describe an experiment to show that exhaled air contains more carbon dioxide than ordinary air. Explain your observations of the experiment.

22. A burning candle is fixed in a trough containing coloured solution of caustic soda. A gas jar is inverted over it. Mention the changes that will take place.

23. Suppose green plants do not take carbon dioxide and give out oxygen. In such a situation, how would it effect the animal life in water specify.

24. Give a graphical representation of "water cycle in nature". (No description is required).

25 Describe the various steps of "water cycle in nature" in an appropriate sequence (No diagram is required).

26. Why are hydel power stations preferred to thermal power stations? Give any four reasons in a tabular form.

27. Distinguish between the term "Work" and "Energy" Mention any three examples of renewable energy.

28. Describe the meaning of the terms herbivorous and carnivorous. Give two examples of each from animals.

29. Define the terms herbivoros, carnivores omnivores and scavangers in your own words giving an example of each.

30. Explain how among the living organisms only green plants are producers.

31. State how man depends on plant products for his food, shelters, clothes and medicines giving an example of each.

32 A potted tomato plant with floral buds was kept in a fine net cage for about a month. It did not produce fruits, why? Explain.

33 All living beings are classified as producers, consumers or decomposers. How are they differentiated from each other? Explain giving an example of each.

34. Define food chain in your own words giving an example.

35. "Human being is behaving as a great enemy of nature" Give arguments to support this statement with reference to (1) cutting of trees, (2) hunting of wild animals, (3) establishing factories and (4) using pesticides.

36. Describe any four uses of artificial satellites.

37. Mention any two differences between a planet and a star. Name the following planets:

(1) Planet nearest to the earth.

(2) Planet which appears reddish in colour.

(3) Planet which is smallest in our solar system

continued

4.2 MARKING SCHEME OF LA QUESTIONS

Q.NO.	VALUE POINTS	V P WISE MARKS	TOTAL MARKS
(1)	(2)	(3)	(4)
1.	Details about the following:		
	(1) Observation;	½	
	(2) Gathering basic information	½	
	(3) Identifying the problem;	½	
	(4) Thinking about the probable causes;	½	
	(5) Testing of the probable causes through keen observation, and experimentation;	½+½	
	(6) Drawing conclusions;	½	
	(7) Correcting ideas, whenever necessary.	½	4
2.	Any four:		
	(1) Use of electric fan for ironing clothes;	½+½	
	(2) Use of electric bulbs for light;	½+½	
	(3) Use of telephone for communication;	½+½	
	(4) Use of sewing machine for stiching clothes;	½+½	
	(5) Use of hand pump for taking out water;	½+½	
	(6) Use of television for information and entertainment;	½+½	
	(7) Any other	½+½	

(1)	(2)	(3)	(4)
	The doctor behaved as a scientist in the following way:		
	1. Gathered basic information from Mohan through questions.	½	
	2. Examined the patient thoroughly	½	
	(3) Recorded the information	½	
	(4) Identified the probable cause	½	
	(5) Made certain assumptions	½	
	(6) Prescribed medicines tentatively	½	
	(7) Asked for stool test for testing his assumptions	½	
	(8) Ready to correct his assumptions after having enough evidence	½	4
	A. Steps to find out solubility in water:		
	1. To take a glass vesel and fill it with about half water	½+½	
	2. To take a pinch of the material in a vesel	½	
	3. To shake the vesel well	½	
	4. If material disappears, means it is soluble in water.	½	
	5. If the material does not disappear, it means it is insoluble	½.	

(1)	(2)		(3)	(4)
	B.	<u>Any two out of the following methods</u> (1) Magnetic (2) Transparency (3) Floatation (4) Any other	½+½	4
5.	1.	Take two elements, say iron and sulpher	1	
	2.	Test their physica l properties (colour of sulpher and magnetic properties of iron)	1	
	3.	Put them together and heat till red hot	1	
	4.	Test the property of new material formed and draw conclusion.	1	4
6.	I.	<u>DIAGRAM SHOWING THE FOLLOWING CORRECTLY:</u>		
		1. Flask containing tap water with one hole cork;	½	
		2. Tripod stand with wire gauze and spirit lamp (or burner);	½	
		3. Bent glass tube (or delivery tube) with one end in the flask above, the other end in the collecting test tube;	½	
		4. Collecting test tube in a container having ice cold water and kept at the lower level tha n that of the flask	½	

(1)	(2)	(3)	(4)
	II. DESCRIPTION		
	1. Heating of the flask to vapourize the tap water which moves out through bent glass tube.	$\frac{1}{2}+\frac{1}{2}$	
	2. Collection of water vapours as distilled water in the collecting test tube.	$\frac{1}{2}+\frac{1}{2}$	4
7.	Description of the following methods		
	1. Magnetic separation to separate iron filings	1	
	2. Solution in water	1	
	3. Filtration to separate sulphur	1	
	4. Crystallization/evaporation to get sugar from the solution	1	4
8.	1. The volume of a cube =(side)^3	$\frac{1}{2}+\frac{1}{2}$	
	2. Putting the value of side (2cm) gives volume 8cm^3	$\frac{1}{2}+\frac{1}{2}$	
	3. Take a graduated cylinder half filled with water. Note its initial reading ('x' ml) and then slowly put the cube inside the water and note the final reading ('y' ml)	$\frac{1}{2}+\frac{1}{2}$	
	4. The difference of the two readings will give the volume of the glass slab which will be 8cm^3 (8ml)	$\frac{1}{2}+\frac{1}{2}$	4

(1)	(2)	(3)	(4)
9. A.	For writing any two precautions :		
	1. Take out a thermometer and put its bulb inside a water at room temperature	1	
	2. Give jerk to the thermometer to bring down mercury level to the initial level.	1	
	3. Do not touch the bulb of the thermometer	1	
	4. Keep the thermometer below the tongue	1	
B.	Range of temperature		
	5. For range in celsius 35°C to 42°C	1	
	6. The temperature of human body does not go beyond these temperature	1	4
10.	Statement of any four examples.		
	1. On dissolving ammonium chloride in water, the container becomes cool.	1	
	2. On melting ice into water, the container becomes cool.	1	
	3. On placing a few drops alcohol on our skin, alcohol evaporates and cooling sensation is felt	1	
	4. On placing glucose on the tongue it feels cool	1	
	5. any other similar example.	1	4

(1)	(2)	(3)	(4)
11.	<u>Four steps as follows</u>		
	1. Burning of match stick; a chemical change.	$\frac{1}{2}+\frac{1}{2}$	
	2. Burning of the candle; a chemical change	$\frac{1}{2}+\frac{1}{2}$	
	3. Melting of the wax; a physical change	$\frac{1}{2}+\frac{1}{2}$	
	4. Solidification of molten wax; a physical change	$\frac{1}{2}+\frac{1}{2}$	4
12.	<u>Any four examples</u>		
	1. When ammonium chloride is dissolved in water, it absorbs heat energy from water and so the container becomes cool due to loss of heat	$\frac{1}{2}+\frac{1}{2}$	
	2. When ice is kept in a steel container it melts absorbing heat from the container. The container becomes cooler due to loss of heat.	$\frac{1}{2}+\frac{1}{2}$	
	3. When a few drops of alcohol are dropped on our hand, alcohol gets evaporated absorbing heat from our hand. Due to loss of heat, our hand feels cool.	$\frac{1}{2}+\frac{1}{2}$	
	4. When glucose is placed on our tongue it gets dissolved in water present on		

(1)	(2)	(3)	(4)
	the tongue. This change absorbs energy from the tongue. Due to this tongue feels cool.	$\frac{1}{2}+\frac{1}{2}$	
	5. Any other	$\frac{1}{2}+\frac{1}{2}$	4
13.	A. <u>Any four observations</u>		
	1. Burning of wax;		
	2. Burning of wick;		
	3. Production of heat;		
	4. Production of light;		
	5. Melting of wax;		
	6. Solidification of molten wax	$\frac{1}{2}$x4	
	B. <u>Classification as physical Chemical change of any four:</u>		
	1. Chemical 2. Chemical		
	3. Chemical 4. Chemical		
	5. Physical 6. Physical.	$\frac{1}{2}$ [illegible]	4
14.	1. A body is said to be in motion when it changes its position with respect to a fixed point in space.	1	
	2. Examples:		
	(i) <u>Linear motion</u> – Motion of the bicycle as a whole	1	
	(ii) <u>Periodic</u> Motion of the paddle.	1	
	(iii) <u>Circular</u> – Motion of the wheel as well as the paddle	1	4

(1)	(2)			(3)	(4)
15.	Four diagrams showing the position of load, effort and fulcrum correctly and labelling properly.			1x4	4
16.	Character	Mango Plant	Cow		
	A. Movement	Fixed	Moves freely	1	
	B. Food	Manufacture their own food	Obtains food from green plants	1	
	C. Growth	Grows throughout their life	Grows upto a certain age only	1	
	D. Reproduction	Reproduces through seeds	Reproduce by giving birth to babies.	1	
17.	Any four of the following				
	1. Plants are fixed but animals move from one place to another;			1	
	2. Green plants can synthesize food but animals cannot;			1	
	3. Plants grow throughout their life but animals grow upto certain age;			1	
	4. Plants absorb inorganic nutrients from the soil while animals eat complex organic materials as food;			1	
	5. Any other.			1	4

(1)	(2)	(3)	(4)
18.	1. Man breathes in air with the help of movements of muscles of the chest and the diaphragm.	1	
	2. The air passes through nostrils, passage in nose, trachea and bronchi to reach lungs	1	
	3. In the lungs, oxygen enters the blood, and water vapour and carbon dioxido are released from the blood.	1	
	4. These (corbon dioxido and water vapour) are removed from lungs with the air breathed out.	1	4
19.	<u>Any four plants with stem modification along with the specific functions:</u>		
	1. Potato: Vegetative propagation/ storage of food	$\frac{1}{2}+\frac{1}{2}$	
	2. Ginger: Vegetative propagation/ storage of food	$\frac{1}{2}+\frac{1}{2}$	
	3. Gourd: Climbing	$\frac{1}{2}+\frac{1}{2}$	
	4. Cactus: Storage of water/food manufacture	$\frac{1}{2}+\frac{1}{2}$	
	5. Any other with correct function	$\frac{1}{2}+\frac{1}{2}$	4
20.	The following eight parts drawn and labelled correctly. Mouth, Oesophagus, Stomach, Small intestine, large-intestine, liver, salivery gland and pancreas.	$\frac{1}{2}$ x8	4

(1)	(2)		(3)	(4)
1.	1.	To blow ordinary air in a glass tumbler containing lime-water with a bicycle pump; it turns milky very very slowly.	½+½	
	2.	To blow air from the mouth in another glass tumbler containing lime water; it turns more milky much faster.	½+½	
	3.	Lime water turns milky in presence of CO_2; it is much less milky when air is passed through it, this means air contains very small quantity of CO_2	½+½	
	4.	Formation of milky substance at faster rate in the second glass tumbler means presence of more carbon dioxide in exhaled air than ordinary air.	½+½	
2.	1	Candle stops burning after sometime;	½	
	2.	Coloured solution rises and fills the the gas jar partially;	½	
	3.	Oxygen is used up in burning and carbon dioxide is formed;	½	
	4.	CO_2 is absorbed by solution and partial vacuum is created;	½+½	

(1)	(2)	(3)	(4)
	5. Water rises to fill this vacuum;	$\frac{1}{2}$	
	6. The remaining air contains nitrogen which is a non-supporter of combustion.	$\frac{1}{2}+\frac{1}{2}$	4
23.	1. Animals consume the entire oxygen of the water and pollute it by adding carbon dioxide.	1	
	2. Plants will not remove carbon dioxide and add oxygen and so the water would no more have oxygen.	1	
	3 Non-availability of oxygen force plants to die as without respiration they cannot remain alive.	1	
	4. Accumulation of corbondioxide in water will also make water unfit for living and due to this also animals would die.	1	4
24.	The graphical representation showing any eight.		
	1. Oceans, ponds, lakes, rivers and underground water/ are water reservoirs in nature.	$\frac{1}{2}$	
	2. Icebergs, mountain snow peaks and frozen lakes are also reservoirs of water (in solid state).	$\frac{1}{2}$	

(1)	(2)	(3)	(4)
	3. Sun warms water, air and snow/ice in nature. On warming water evaporates to add water vapours in air.	½	
	4. On warming air becomes lighter and carries up water vapours.	½	
	5. In atmosphere temperature goes down with height and so water vapour cools to form clouds (containing minute droplets of water)	½	
	6. Drops of water making clouds may fall down as rain filling water reservoirs.	½	
	7. On further cooling, water droplets of clouds may fall down as snow adding snow to mountain peaks and icebergs which on warming melts to form water.	½	
	8. Some water moves down as underground water which is used by plants (also by man)	½	
	9. Water is also utilized by man, animals and plants. It comes back to nature by life processes.	½	4

Note: The examiner will have to judge how many points shown and how well shown before awarding marks.

(1)	(2)	(3)	(4)
25.	1. Water reservoirs (oceans,rivers,lakes, etc.); evaporation of water on sun's heating.	1	
	2. Cloud formation; rain fall and snow fall; Also melting of ice/snow of iceberg and snow peaks of mountains	1	
	3. Availability of water on the ground as underground water, surface water, etc.	1	
	4. Use of water by plants, animals and man to maintain life.	1	4

26. Any four.

	Reasons	Thermal power station	Hydel Power station		
1.	Availability of the source	Due to limited stock of coal it may not remain available in future.	Freely available in nature	1	
2.	Renewability.	Nil	Yes	1	
3.	Cost of the source	Cost of the coal is to be paid	Water is free of cost.	1	
4.	Environmental pollution	Smoke of the thermal power station pollution air.	No pollution	1	
5.	Irrigation facility	Nil	Water is available in large quantity.	1	4

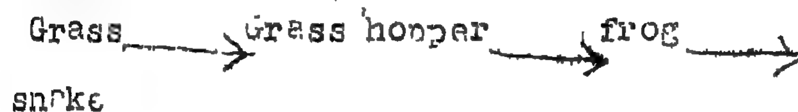
(1)	(2)	(3)	(4)
27.	1. Energy is capacity of doing work. Work is done only when energy is used and it is measured in terms of the product of force and the displacement.	1	
	2. <u>Example of renewable energy.</u> <u>(any three):</u>		
	(i) Wind energy		
	(ii) Energy of flowing water		
	(iii) Solar energy.		
	(iv) biomass		
	(v) Energy of tides.		
	(vi) Any other	1x3	4
28.	1. Herbivorous animals feed on plants;	1	
	Two examples: Rabbit, cow etc.	1	
	2. Carnivorous animal feed on animals;	1	
	Two examples: frog, snake, tiger, etc.	1	4
29.	1. <u>Herbivorous animals</u> - Who eat only plants;	½	
	<u>One example</u> - Goat, Rabbit, etc.	½	
	2. <u>Carnivorous animals</u> - who eat other animals;	½	
	<u>One example</u> - Lion, Tiger, etc.	½	

(1)	(2)	(3)	(4)
	3. Omnivorous animals - Who eat both plants and animals	½	
	One example - Sparrow, Crow, etc.	½	
	4. Scavangers - Who eat dead animals.	½	
	One example - Vultures, kite, etc.	½	4
30.	1. Only the green plants contain chlorophyll; all animals lack it.	1	
	2. With the help of chlorophyll, plants can absorb the energy of the sunlight; animals do not get it.	1	
	3. The absorbed energy is utilized by the plant with the help of chlorophyll in synthesizing food.	1	
	4. Thus sun's energy is stored as food energy; animals get this energy for themselves from plants as food.	1	4
31.	1. Food (cereals, pulses, oil, vegetables etc.	1	
	2. Shelter (building material e.g., timber of shisham etc.)	1	
	3. Clothes e.g. cotton.	1	
	4. Medicine (quinine for cincona plants or Tulsi for cough and fever).	1	4

(1)	(2)	(3)	(4)
32.	1. Tomato is an insect pollinated plant (cross pollinated)	1	
	2. When the plant was covered with a fine net cage no insect can enter into the cage.	1	
	3. So there was no pollination of flown and no fortilization	1	
	4. Consequently no fruits were formed	1	4
33.	1. Producers are green plants which can manufacture food in the presence of sunlight CO_2 and water; One example: Rose, pea, grass, maize, etc.	1	
	2. Consumers are those which depend on producers for their food, e.g. cow or any animal	1	
	3. Decomposers : decompose complex organic matter of dead plants and animals into simple organic matter e.g. Bacteria	1	
	4. Examples (one of each)	1	4

34. 1. Definition: The whole process who eats whom is usually termed the food chain; it starts from a producer i.e. a plant who does not eat any one but manufactures food by itself using sun's energy. 1+1

2. Food chain for example.



snake 1+1 4

35. 1. Cutting of trees: reduces the number of producers which would result in less food for animals and man; it also affects rain fall adversely; causes floods and soil erosion. 1

2. Hunting of wild animals: disturbs balance of natures food chain gets disturbed. 1

3. Establishing factories: the smoke, chemical waste, etc. pollute water, air and land resulting in health hazards for animals, plants and man. 1

4. Using pesticides: Add harmful chemicals to water and soil resulting health hazards for plants, animals and man. 1 4

(1)	(2)	(3)	(4)
16.	Description of any four of the following:		
	1. Weather forecasting;		
	2. Television and radio transmission		
	3. Communication		
	4. Locating mineral resources		
	5. Improvement of agricultural production		
	6. Any other	1x4	4
17.	I. Any two of the following:		
	1. Stars are self luminous while planets are non-luminous.	$\frac{1}{2}+\frac{1}{2}$	
	2. Stars twinkle while planets do not;	$\frac{1}{2}+\frac{1}{2}$	
	3. Star is source of light and heat. but planet can only reflect light to us.	$\frac{1}{2}+\frac{1}{2}$	
	II. Names of the Planets		
	(i) Venus	1	
	(ii) Mars	1	
	(iii) Mercury	1	4

continued:

4.5 QUESTION-WISE ANALYSIS OF LA QUESTIONS :

Q. No.	Objective.	Specification	Unit number	Form of questions	Marks	Time (minute)	Difficulty level
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	K	Recalls	1.2	LA	4	10	C
2	U	Cites examples	1.1	LA	4	10	B
3	A	Establishes relationship	1.2	LA	4	12	A
4	K	Recalls	2.1	LA	4	10	C
5	U	Compares	2.2	LA	4	10	B
6	K & S	Recalls and draws	3.2	LA	4	10	B
7	U	Translates	3.2	LA	4	10	B
8	U	Calculates	4.1	LA	4	10	B
9	U	Interprets	4.2	LA	4	10	B
10	K	Recalls	5.3	LA	4	10	C
11	U	Classifies	5.1	LA	4	10	B
12	U	Explains	5.3	LA	4	12	B
13	U	Classifies	5.1	LA	4	12	B
14	A	Analyses	5.1	LA	4	12	A
15	S	Draws and labels	6.3	LA	4	12	B
16	U	Compares	7.3	LA	4	12	B
17	K	Recalls	7.3	LA	4	10	C
18	K	Recalls	8.2	LA	4	10	B
19	U	Relates	8.1	LA	4	10	B
20	S	Draws and labels	8.2	LA	4	12	B
21	U	Translates	9.2	LA	4	10	B
22	U	Translates	9.2	LA	4	10	B

(2)	(3)	(4)	(5)	(6)	(7)	(8)
A	Establishes relationship	9.3	LA	4	12	A
U	Translates	10.4	LA	4	[illegible]	[illegible]
U	Interprets	10.4	LA	4	10	B
U	Compares	11.4	LA	4	10	B
U	Distinguishes	11.2	LA	4	10	B
U	Cites examples	12.1	LA	4	8	B
U	Translates	12.1	LA	4	10	B
U	Interprets	12.1	LA	4	10	B
K	Recalls	12.1	LA	4	10	C
A	Gives reason	12.1	LA	4	10	A
U	Compares	12.2	LA	4	10	B
U	Cites examples	12.2	LA	4	10	B
A	Establishes relationship	12.3	LA	4	12	A
K	Recalls	13.3	LA	4	10	C
U	Compares	13.3	LA	4	10	B

Note: Use abbreviations as follows:

(a) For objectives: K= Knowledge, U= Understanding, A= Applications, S= Skill.

(b) For form of questions: O=Objective, VSA=Very short-answer, SA=Short answer, LA= Long-answer

(c) For difficulty level of questions: A= Diffucult, B= Average, C= Easy.

FIVE

MATCHING EXERCISES

Matching exercises are constructed as sample questions and given in 5.1 alongwith their scoring key and question-wise analysis (or item characteristics) in 5.2 and 5.3 respectively.

5.1. SAMPLE MATCHING EXERCISES

Q.No.1-5.

There are two columns I and II mentioning the discoveries (or inventions) and names of scientists respectively. You have to match each discovery (or invention) of column I with the scientist who discovered (or invented) it as mentioned in column II. Each item of the column II can be used only once.

Indicate your answer by giving the question number of column I alongwith the serial number of column II in your answer-book.

Column I	Column II
1. Use of plants as medicines.	(i) Edward Jenner
	(ii) S N Bose
2. Sensitivity of plants	(iii) J C Bose
3. Vaccin to protect people against diseases.	(iv) Alexander Fleming.
	(v) Marie Curie
	(vi) Nagarjuna
4. Cure of people from several infectious diseases	(vii) S. Ramanujan
	(viii) Leeuwenhoek.
5. Preparation of Microscope.	

Q.No.6-9.

There are two columns I and II. In column I different compounds are given and in column II the elements which constitutes them.

You have to match the compounds in column I to the elements in column II. Each item in column II can be used once only.

Indicate your answer by giving the question number of column I and serial number of column II in your answer book.

Column-I. - Compounds	Column-II. Elements.
6. Urea	(i) Carbon, hydrogen
7. Washing soda	(ii) Carbon, hydrogen, oxygen.
8. Kerosene	(iii) Carbon, hydrogen, oxygen, Nitrogen.
9. Sugar	(iv) Sodium, carbon, oxygen.
	(v) Sodium, Chlorine, hydrogen
	(vi) Sodium, Chlorine, Oxygen.
	(vii) Iron, Sulphur, Oxygen.

Q.No.10-13.

You are given mixtures in column I and processes for their separation in column II. Suggest the process of column II once only for the mixture of column I and write the number of column within the brackets corresponding to item of column I.

Column I	Column II
10. Two miscible liquids having boiling points 40°C and 70°C.	(i) Distillation
	(ii) Hand picking
	(iii) Filtration
11. Camphor and common salt.	(iv) Sublimation
	(v) Decantation.
12. Iron filings and sand.	(vi) Magnetic separation
13. Petrol and water.	(vii) Separating funnel.

Q. No. 14-17.

There are two columns I and II. In column I different types of thermometers are given and in column II their corresponding temperature range is given.

You have to match the thermometers from column I to its temperature in column II. Each item of column II can be used once only.

Indicate your answer by giving the question number of column I and the serial number of column II in your answer book.

Column I.	Column II
14. Clinical thermometer	(i) -80°C to 150°C
15. Laboratory thermometer	(ii) -30°C to 50°C
16. Maximum-Minimum thermometer	(iii) -10° C to 150°C
	(iv) 0°C to 100°C
	(v) 0°C to 500°C
17. Metal thermometer.	(vi) 35°C to 42°C
	(vii) 90°C to 110°C

Q.Nos. 18-21.

There are two columns. Column I provides four examples of changes while column II gives types of changes. You have to match each item of column I with appropriate types of changes of column II. You can use items of column II once only. Write the serial number of column II against the corresponding item of column I.

Column I	Column II
18. Burning of a paper	(i) Slow physical change.
19. Swinging of a pendulum	(ii) Irreversible periodic change.
	(iii) Reversible undesirable change.
20. germination of a seed	(iv) Fast physical change.
21. spinning of a top.	(v) Undesirable chemical change
	(vi) Desirable chemical change.
	(vii) Undesirable physical change.
	(viii) Undesirable periodic change.

Q.Nos. 22-25.

Column I contains some changes and

Column II contains some examples.

Select a suitable example for each change.

Column I	Column II
22. Change in state	(i) Burning of agarbatti.
23. Change in shape.	(ii) Cooking of food.
	(iii) Bursting of a cracker.
24. Change in size.	(iv) Bursting of a balloon.
25. Change in position.	(v) Glowing of a fire-fly.
	(vi) Rotation of a fan.
	(vii) Falling of rain.

Q.Nos. 26-29.

There are two columns I and II. In column I different types of forces are given and in column II the corresponding situation related to them are given.

You have to match the force from column I to its examples in column II. Each item of column II can be used once.

Indicate your answer by giving the question number of column I alongwith the serial number of column II in your answer book.

Column I	Column II.
26. Muscular	(i) picking up of paper bits by a plastic comb rubber with dry hair.
27. Electrostatic	(ii) Bullock pulling a cart.
28. Gravitational	(iii) Rotation of moon around the earth.
29. Frictional.	(iv) Load stone attracting iron pieces.
	(v) Explosion of a bomb.
	(vi) Boiling of water on heating.
	(vii) Production of heat on rubbing.

Q.Nos. 30-33.

There are two columns I and II. In column I there is a list of animals while column II provides the type of food eaten.

You have to match each animal of column I with the type of food eaten by it given in column II. Each item of column II can be used once, more than once, or not at all.

Indicate your answer by giving the question number of column I and the serial number of column II in your answer book.

Column I	Column II
30. Rat	(i) Live insects
31 Moth	(ii) Nectar
32. House lizard	(iii) Plant leaves
33. Vulture.	(iv) Flash of animals
	(v) Bread
	(vi) Wood
	(vii) Snakes.

Q.Nos. 34-37.

There are three columns i.e. I, II and III. In the column I there is a list of four animals while the column II provides animal behaviour. Column III gives the type of foods they usually eat.

You have to match each animal of the column I with the appropriate animal behaviour given in the column II. Each item of column II can be used once, more than once, or not at all. Then you have to match each animal of

column I with the type of food given in column III. Each item of column II can be used once, twice or not at all.

Indicate your answer by giving appropriate serial number of the column II and appropriate letter of the column III along with the question number as given in column I.

Column I (Animal)	Column II (Behaviour).	Column III (food)
34 Rat	1. Likes light but active in night.	A. Live insects
35 Moth	2. Like light and active in day	B. Flower nectar
36 House lizard	3. Does not like day light.	C. Flesh of animals
37 Vulture	4. Does not like day light and active in night.	D. Plant leaves
	5. Does not like day light but active day and night.	E. Bread
		F. Dead organic matter
		G. Wood
		H. Snakes.

Q.Nos. 38-42

There are two columns I and II mentioning the name of the plant and its characteristic respectively. Match each characteristic of column I with which it is associated and named under column II. Each item of column II can be used once or twice.

Indicate your answer in your answer book by giving question number along with the serial number of the answer selected from column II.

Column I	Column II
38. Sweet potato	(i) Fleshy stems
39. Cactus	(ii) Hanging rope like roots
40. Gourd	(iii) Swollen to store food.
41. Potato	(iv) Thick trunk covered with bark
42. Onion.	(v) Coiled thread like tendril
	(vi) Edible scale leaves.

Q.Nos. 43-46.

Complete the items given in column I with an appropriate statement given in column II by writing the serial number in brackets shown against the item. (Use one statement only once).

Column I	Column II
43. Carbon dioxide	(i) is most abundant in air.
44. Oxygen	(ii) is used in filling balloons
45. Nitrogen	(iii) is used in photosynthesis.
46. Water vapour	(iv) is a supporter of combustion.
	(v) is a coloured gas.
	(vi) condenses on a tumbler containing ice.
	(vii) has pungent smell.

Q.Nos. 47-50.

Mentioned below are appropriately related statements of column I with items of column II. Match the statements from column I with only one item of column II and write the serial number against the item of column I in your answer book along with the question number.

Column I	Column II.
47. Oceans cover more than 2/3 surface of the earth.	(i) Pollution
48. Water normally exists as a liquid at room temperature.	(ii) Water is essential for germination
49. Water provides recreation and sport facilities.	(iii) Soft water
50. We should avoid cleaning of utensils and washing of clothes near the sources of water.	(iv) Uses of water
	(v) Physical properties of water
	(vi) Sources of water
	(vii) Water cycle.

Q.Nos. 51-54.

Mentioned below are appropriately related items/statements in column I and II. Match the items from column I with ONLY one item/statement of column II and write the serial number against the question number of column I in your answer book.

Column I	Column II.
51. Hardness of water	(i) Water is essential for germination.
52. Water borne diseases.	(ii) Water drops are found on a glass tumbler containing ice.
53. Cloud	(iii) River water instead of rain water gives less lather with soap.
54. Loss of water.	(iv) Malaria.
	(v) Evaporation of sea water.
	(vi) Sweating.
	(vii) Typhoid.

Q.Nos. 55-58.

There are two column I and II. In column I different energy conversions are given and in column II some appliances in which energy conversion takes place are given.

You have to match the conversions of energy from column I to the appliance in column II. Each item of column II can be used once.

Indicate your answer by giving the question number of column I and the serial number of column II in your answer book.

Column I	Column II
55. Heat --- Mechanical	(i) Torch cell.
56. Electrical---Sound	(ii) Cycle
57. Chemical---Electrical	(iii) Electric Kettle
58. Electric---Heat.	(iv) Electric fan.
	(v) Sewing machine.
	(vi) Electric siren.
	(vii) Steam engine.

Q.Nos.59-62.

Match the animals written in column I with their mode of eating given in column II. You can use the items of column II once or twice only. Record your answer by writing the question number along with the serial number of column II in your answer book.

Column I Animal	Column II Mode of eating
59. Camel	(i) Omnivorous
60. Vulture	(ii) Herbivorous
61. Sparrow	(iii) Parasitic
62. Ant	(iv) Insectivorous
	(v) Carnivorous.

Q.Nos.63-66.

There are two columns I and II. In column I there are the names of planets while in column II the characteristics of these planets.

You have to match each planet of column I with the characteristics in column II. Each item of column II can be used once.

Indicate your answer by giving the question number of column I and the serial number of column II in your answer book.

Column I	Column II
63. Pluto	(i) Nearest to the earth
64. Saturn	(ii) Have artificial satellites
65. Mercury	(iii) Takes maximum time in revolving around the sun.
66. Earth	(iv) Have maximum number of satellites.
	(v) Heaviest planet in the solar system.
	(vi) Brightest planet of solar system.
	(vii) Having no satellite of its own.

continued

5.2. SCORING KEY FOR MATCHING QUESTIONS

Q.No.	Key	Q.No.	Key
1	(vi)	24	(iv)
2	(iii)	25	(vi)
3	(i)	26	(ii)
4	(iv)	27	(i)
5	(viii)	28	(iii)
6	(iii)	29	(vii)
7	(iv)	30	(v)
8	(i)	31	(ii)
9	(ii)	32	(i)
10	(i)	33	(iv)
11	(iv)	34	4-D
12	(vi)	35	1-B
13	(vii)	36	4-A
14	(vi)	37	2-C
15	(iii)	38	(iii)
16	(ii)	39	(i)
17	(v)	40	(v)
18	(v)	41	(iii)
19	(ii)	42	(vi)
20	(vi)	43	(iii)
21	(iv)	44	(iv)
22	(i)	45	(i)
23	(ii)	46	(vi)

Q. No.	Key
47	(vi)
48	(v)
49	(iv)
50	(i)
(51)	(iii) (iii)
52	(vii)
53	(v)
54	(vi)
55	(vii)
56	(vi)
57	(i)
58	(iii)
59	(ii)
60	(v)
61	(i)
62	(i)
63	(iii)
64	(iv)
65	(vii)
66	(ii)

continued

5.3 QUESTION-WISE ANALYSIS OF MATCHING QUESTIONS

Q. No.	Objective	Specifications	Content Sub-unit Number.	Form of questions	Marks allotted.	Approx. time (minute)	Estimated difficulty level.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	U	Relates	1.3	MAT	1	1	B
2	U	Relates	1.3	MAT	1	1	B
3	U	Relates	1.3	MAT	1	1	B
4	U	Relates	1.3	MAT	1	1	B
5	U	Relates	1.3	MAT	1	1	B
6	K	Recognises	2.4	MAT	1	1	C
7	K	Recognises	2.4	MAT	1	1	C
8	K	Recognises	2.4	MAT	1	1	C
9	K	Recognises	2.4	MAT	1	1	C
10	U	Relates	3.2	MAT	1	1	B
11	U	Relates	3.2	MAT	1	1	B
12	U	Relates	3.2	MAT	1	1	B
13	U	Relates	3.2	MAT	1	1	B
14	U	Relates	4.6	MAT	1	1	B
15	U	Relates	4.6	MAT	1	1	B
16	U	Relates	4.6	MAT	1	1	B
17	U	Relates	4.6	MAT	1	1	B
18	U	Classifies	5.1	MAT	1	1	B
19	U	Classifies	5.1	MAT	1	1	B
20	U	Classifies	5.1	MAT	1	1	B
21	U	Classifies	5.1	MAT	1	1	B

(1)	(2)	(3)	(4)	(5)	(6)	(7)	
22	U	Cites examples	5.1	MAT	1	1	B
23	U	Cites examples	5.1	MAT	1	1	B
24	U	Cites examples	5.1	MAT	1	1	B
25	U	Cites examples	5.1	MAT	1	1	B
26	U	Relates	6.2	MAT	1	1	B
27	U	Relates	6.2	MAT	1	1	B
28	U	Relates	6.2	MAT	1	1	B
29	U	Relates	6.2	MAT	1	1	B
30	U	Relates	6.2	MAT	1	1	B
31	U	Relates	6.2	MAT	1	1	B
32	U	Relates	6.2	MAT	1	1	B
33	U	Relates	6.2	MAT	1	1	B
34	U	Classifies	7.1	MAT	1	1	A
35	U	Classifies	7.1	MAT	1	1	A
36	U	Classifies	7.1	MAT	1	1	A
37	U	Classifies	7.1	MAT	1	1	A
38	U	Relates	8.1	MAT	1	1	B
39	U	Relates	8.1	MAT	1	1	B
40	U	Relates	8.1	MAT	1	1	B
41	U	Relates	8.1	MAT	1	1	B
42	U	Relates	8.1	MAT	1	1	B
43	U	Relates	8.1	MAT	1	1	B
44	U	Relates	9.2	MAT	1	1	B
45	U	Relates	9.2	MAT	1	1	B
46	U	Relates	9.2	MAT	1	1	B
47	U	Relates	10.2	MAT	1	1	B
48	U	Relates	10.2	MAT	1	1	B

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
49	U	Relates	10.2	MAT	1	1	B
50	U	Relates	10.2	MAT	1	1	B
51	U	Relates	10.5	MAT	1	1	B
52	U	Relates	10.5	MAT	1	1	B
53	U	Relates	10.5	MAT	1	1	B
54	U	Relates	10.5	MAT	1	1	B
55	U	Cites example	11.3	MAT	1	1	B
56	U	Cites example	11.3	MAT	1	1	B
57	U	Cites example	11.3	MAT	1	1	B
58	U	Cites example	11.3	MAT	1	1	B
59	K	Recognises	12.1	MAT	1	1	C
60	K	Recognises	12.1	MAT	1	1	C
61	K	Recognises	12.1	MAT	1	1	C
62	K	Recognises	12.1	MAT	1	1	C
63	U	Cites example	13.1	MAT	1	1	B
64	U	Cites example	13.1	MAT	1	1	B
65	U	Cites example	13.1	MAT	1	1	B
[illegible]	U	Cites example	13.1	MAT	1	1	B

Note: Use abbreviations as follow:

(a) For Objectives: K= Knowledge, U=Understanding
A=Application S= Skill

(b) For form of questions: O=Objective, VSA=Very short answer,
SA= Short answer, LA= Long answer.

(c) For difficulty level of question:
A=difficult, B=Average, C=Easy.

APENDIX-A *

A CHECKLIST FOR THE IMPROVEMENT OF QUESTIONS

This checklist is useful for reviewing each individual question in order to reveal its strengths and weaknesses. It is devised in such a way that when any of its questions is answered 'yes' it reveals a strength but when answered 'no' it reveals a weakness which means 'improve it, if feasible, or otherwise reject the question'. Thus, each question presents a desired attribute of a good objective-based question.

Vetting of questions usually requires their item-characteristics and scoring key/marking scheme which are usually written on the item-sheet. If these are not available, it is desired that these are prepared before starting vetting of questions. It is also recommended the improved question (or test item) may again be checked using this checklist to find out whether any other weakness has crept in during its refinement. After validating a question (or test-item), it may be tried-out and if approved, stored in the 'question bank' for its use as and when required.

PART-I : FOR ALL FORMS OF QUESTIONS :

Sl. No.	Desired attributes of a good question	Yes	No
1	2	3	4
1.	Does it measure a single pre-determined objective and its specification?		

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1	2	3
	Note: An essay (or long answer) question may test cognitive domain (knowledge, understanding or application) alongwith drawing skill.	

2. Does it sample a significant area of content ?
3. Is it well within the scope of the syllabus (or textbook) of the class concerned?
4. Is it the most appropriate form of question to test the ability and content intended?
5. Is it set at the desired level of item-difficulty?
6. Is it appropriate for the class deisred?
7. Is it well within the comprehension of the pupils?
8. Does it provide an appropriate testing situation?
9. Has the question set the task pin-pointing almost a definite answer?
10. Is it worded in a precise, simple, clear and unambiguous language?
11. Does it exclude unfamiliar and difficult word/or term in the question?

1	2	3	4
12.	Is it concise enough to avoid unnecessary reading load?		
13.	Does it exclude unnecessary (or superfluous) words or phrases (or even sentences) ?		
14.	Does it communicate the meaning and intent of the item writer effectively?		
15.	Is it likely that all examinees (and examiners) will make the same meaning of the task communicated through the question?		
16.	Will it be translated into Indian regional languages without distorting sentence structure and providing a clue to the collect answer?		
	FOR VSA, SA AND LA (ESSAY) QUESTIONS:		
17.	Does it use the most appropriate directional word in terms of predetermined objective and content?		
18.	Does the directional word direct the examinees adequately for the style of the answer?		
19.	Is it free from unprecise directional words, e.g. write short notes on, write an account of, what do you know about, etc.?		

1	2	3	4
20.	Does it involve adequate number of significant value points?		
21.	Does the marking scheme reflect the answer as expected by the question?		
22.	Does the marking scheme provide value point-wise distribution of marks appropriately?		
23.	Does the value points have equal numerical weightage?		
24.	Does the marking scheme have a provision of all possible answers or value points appropriately?		
25.	Is it structured appropriately to specify the scope (or length) and style of the answer adequately?		
26.	Is the allocation of numerical weightage to it appropriate?		
	PART II. FOR MULTIPLE-CHOICE QUESTIONS:		
	II-A ABOUT THE TEST ITEM		
1.	Does the item offer only the minimum essential reading load to the examinee?		
2.	Does it include necessary instruction for answering it?		
3.	Is it free from a verbal association between the stem and the key providing a clue to the correct answer?		

1	2	3	4
4.	Is it free from a grammatic clue?		
5.	Is it free from the defect of providing greater details in the key (or having lengthier key) than the distractors?		
6.	Is it free from the defect of providing answer of an item by the stem of another item?		
7.	Is it free from a possible clue likely to be offered by the sequence of arrangement of the alternatives?		
8.	Is it free from a possible clue likely to be offered by a word (or words) on translation into other languages?		
	II-B ABOUT THE STEM:		
9.	Will the examinee be able to receive the meaning and intent of the task from the stem itself even without going through the alternatives? (This requires to set the task explicity in the stem itself).		
10.	Does the stem of the item present a single definite problem or task in positive terms as a general rule?		
11.	Are the words like <u>no</u>, <u>not</u>, <u>least</u>, <u>never</u>, <u>poorest</u>, <u>except</u>, <u>best</u>, <u>always</u> etc. underlined, if used in the stem?		

12. Does the stem of the item include as much of the statement as possible but no irrelevant material?

13. Does the stem leave a single blank pre-ferably in the middle, in case of completion item of Multiple-choice variety?

14. Does the item measure a single significant learning outcome having an allocation of one value-point, one or two minutes time and one mark?

II C ABOUT THE ALTERNATIVES:

15. Are the alternatives involving only numbers placed in an ascending or discending order?

16. Is the use of all the above none of the above or both of the above functional?

17. Are the alternatives as brief as possible (but not cryptic)?

18. Are the alternatives free from such material which could have been placed appropriately in the stem?

19. Are all alternative homogenous and of almost similar length?

1	2	3	4
20.	Do the alternatives focus attention on the essential differences among them?		
21.	Do the alternatives sample a wider content without losing its homogeneity?		
	II - D ABOUT THE KEY		
22.	Is there only one correct or best answer (Key) ?		
23	Is the key a non-stereotyped phrase or word or a sentence?		
24.	Is the key placed in each alternative position almost equally?		
25.	Is the placement of key at random?		
	II E ABOUT DISTRACTERS:		
26.	Are all the distracters plausible (or almost equally attractive to an uninformed examinee)?		
27.	Do the distracters appear as mistakes commonly made by pupils?		
	II F ABOUT FORMAT OF MULTIPLE CHOICE ITEM		
28.	Does it leave a little space between the stem and the alternatives?		
29.	Does it use a larger margin for writing the alternatives?		
30.	Does it begin writing of alternatives with a capital letter when the stem is in a question form?		

1	2	3

31. Does it begin writing of alternatives with a small letter and end them with a sign of full stop when the stem is an incomplete statement?

32. Does it employ 4 or 5 (usually four) alternatives in each item?

33. Are the alternatives numbered serially by capital letters (i.e. A,B,C,D) or Arabic numerals 1,2,3,4 ?

34. Are the items numbered serially by Arabic numerals, i.e. 1,2,3......

PART III FOR COLUMN MATCHING TEST ITEMS

1. Do the items of column I represent the premises or stimulus items or questions?

2. Do the items of column II represent the responses or alternatives?

3. Are the premises numbered by Arabic numerals (i.e.1,2,3 etc.), alternatives by capital letters (i.e.A,B,C etc.) and the columns by Roman capital numerals (i.e. I,II etc.)?

4. Is the column I located on the left hand side?

5. Does the number of premises range from 4 to 6 only ?

1	2	3	4
6.	Is there only one correct answer for each term or stimulus item?		
7.	Are the items free from various types of clues? (verbal, grammatical, or translacory clues).		
8.	Are there atleast 3 more responses in the column II than the number of premises in column I if the response words are to be used only once for matching?		
9.	Are there clear instructions about using stimulus words for matching once, twice or more times?		
10.	Is the basis of matching specified adequately?		
11.	Are the stimulus words plausible and homogenous?		
12.	Does the column matching exercise use an appropriate format?		
13.	Does each promise measure a single significant learning outcome having an allocation of one minute's time, one value point and one mark weightage only?		

1 2 3

PART IV MASTER MATCHING TEST ITEMS:

1. Does the Master-matching exercise employ an appropriate format?
2. Do the items of the Master-list represent alternatives?
3. Do the items which follow the Master list, represent premises or questions?
4. Are the items of Master-list numbered by capital letters (i.e.A,B,C,D etc), and the premises (or questions) by Arabic numerals (i.e.1,2,3 etc.)?
5. Does the number of alternatives range from 3-5 only?
6. Does the number of questions (or premises) range from 5-10 only?
7. Is there only one correct answer for each premise (or question)?
8. Are the alternatives plausible, homogenous and free from clues?
9. Are there clear insturctions about using the responses of Master-List for matching once, twice, or more times?
10. Is the basis of matching is specified in the instructions adequately?

1	2	3	4

11. Does the each question measure a single significant learning outcome having one value-point, one mark, and one minutes' time allocation only?

PART V FOR ALTERNATIVE RESPONSE (OR TRUE-FALSE) ITEMS

1. Does the alternative-response exercise employ an appropriate format?
2. Does the number of questions range from 4 to 6 only?
3. Is there only one definite correct answer for each question?
4. Does it include adequate instructions for attempting the question and recording the responses?
5. Is the question written in the form of a declarative statement?
6. Does it mention about the response word i.e. T or F (True or False), Y or N (Yes or No), F or O (Fact or Opinion), etc. clearly?
7. Does the each question measure a single, significant learning outcome having one mark, one value point and one minute's time allocation only?

1 2 3 4

PART VI FOR COMPLETION ITEMS :

1. Does the each question measure a single definite and significant learning outcome?
2. Has the each question been allocated one mark, one minute's time and only one value-point?
3. Does it leave a single blank but never in the beginning of the question?
4. Does it expect an answer of one number, one word or a phrase only?
5. Is the answer of the question fixed or almost fixed?
6. Does the each set of completion items include 4-6 questions?
7. Is the basis of filling the blank specified adequately in the instructions?
8. Does it provide the blanks of uniform size in all questions of completion variety placed together?

PART VII: FOR VERY SHORT ANSWER QUESTIONS:

1. Does it measure a single significant value point of learning?
2. Has it been allocated one mark only in terms of numerical weightage?

1	2	3	4
3.	Does it expect an answer of a length ranging from one word to one sentence or sometimes, only of one number or a set of numbers?		
4.	Is the answer of the question fixed or almost fixed?		
5.	Will it be attempted usually within the estimated time, about 1 minute by an average examinee?		
6.	Does it employ a directional word well suited for VSA questions (i.e. not requiring an extended answer)?		
7.	Does it leave a single blank, never in the beginning, if it is a completion type VSA question?		
	PART VIII FOR SHORT ANSWER QUESTIONS		
1.	Does it require a coherent answer about a problem or concept instead of demanding answer of two or more VSA questions?		
2.	Does it involve suitable number of value points (usually 2-4) visualizing the allocation of time and numerical weightage?		

1	2	3	4

3. Has it been allocated 2-4 marks only (usually 2)?

4. Does it expect an answer involving usually 2-4 sentenced or 30-50 words or a diagram only?

5. Has the marking scheme detailed out to value points or 1 or ½ mark level?

6. Will it be attempted usually within the allocated time of about 3-5 minutes by an average examinee?

PART IX FOR LONG ANSWER QUESTIONS

1. Does it measure a single pre-determined objective and the specification from the cognitive domain with or without a skill objective?

2 Does it require a coherent extended answer about a problem or concept instead of demanding answers of 2 or more VSA and/or SA questions.?

Note: In no case, a long-answer question should appear as an assembly of 2 or more VSA and/or SA questions from the same or different topics

1	2	3	4
3.	Will it communicate the task effectively?		
4.	Does it employ the directional word in such a way as to guide for the style of the answer appropriately?		
5.	Does the marking scheme reflect the answer as intended by the question?		
6.	Does the marking scheme have provision for all possible alternative answers or value points appropriately?		
	P.R.I.K. FOR TEST PAPERS		
1.	Does it sample the content of the entire unit (of course) adequately?		
2.	Is there a question providing clue to answer any other question?		
3.	Is there any overlapping question?		
4.	Is the test length appropriate in terms of time-allocation?		
5.	Does it provide single blank of uniform size in completion questions?		
6.	Are the questions with common directions placed together as one set?		

1	2	3	4
7.	Are there adequate instructions about different forms of questions and their grouping, approximate length required for each type of question, and marks allotted to them?		
8.	Are the instructions worded in simple, clear, precise and unambiguous language?		
9.	Are there appropriate directions about recording the answer of objective question including the multiple-choice question and regarding penalty for a wrong answer?		
10.	Are there appropriate directions about changing the answer already recorded?		

APPENDIX - B

DESIGN

Subject.................... Class....................

Unit.................... Marks....................

Time....................

1. WEIGHTAGES TO OBJECTIVES

OBJECTIVES	K	U	A	S	TOTAL
PERCENTAGE OF MARKS	%	%	%	%	%
MARKS	...	...	...	...	...

2. WEIGHTAGES TO FORM OF QUESTIONS

FORMS OF QUESTIONS	E/LA	SA	VSA	O	TOTAL
NO. OF QUESTIONS	...	...	...	...	...
MARKS ALLOTTED	...	...	...	...	...
ESTIMATED TIME	...	...	...	...	...

3. WEIGHTAGE TO CONTENT

CONTENT SUB-UNITS	PERCENTAGE OF MARKS	MARKS
1.	...	...
2.	...	...
3.	...	...
4.	...	...
5.	...	...
6.	...	...
7.	...	...
Total	...	...

4. Estimated difficulty level:

Difficult (A)..........%, AVERAGE:......%,
Easy (C):..........%

5. Scheme of sections...

6. Scheme of options...

....

K = Knowledge, U= Understanding A= Application,

S = Skill; E/LA = Long Answer (Essay), SA =Short answer,

VSA= Very short Answer, O= Objective, MPC=Multiple Choice

MTC= Matching, T/F= True-False.

SUBJECT ______ TIME ______

UNIT ______ MARKS ______

Sub Unit Number	Knowledge				Understanding				Application				Skill		TOTAL
	LA	SA	VSA	O	LA	SA	VSA	O	LA	SA	VSA	O	LA	SA	
SUB TOTAL															
TOTAL															

Note: 1. Figures within brackets indicate the number of questions and figures outside the brackets indicate marks.

2. *Denotes that marks have been combined to form one question.

SUMMARY

Type of question	No. of question	Marks allotted
LA		
SA		
VSA		
MPC		

Difficulty level of questions ______

Details of options, if any: ______

ITEM SHEET

CLASS & SUBJECT ______________ UNIT ______________

OBJECTIVE ______________ SUB UNIT ______________

SPECIFICATION ______________ MARKS ______________

FORM OF QUESTION ______________ ESTIMATED TIME ______________

ESTIMATED DIFFICULTY LEVEL ______ DATE ______________

Q. NO.

MARKING SCHEME

NOTE: Give key for objective type, complete expected answer for Very Short and Short answer type and outline answer for Essay type questions.

Q. NO.	VALUE POINTS/KEY	VALUE POINTS WISE MARKS

TEXT BOOK USED: ______________

PAPER WRITER: ______________

SCORING KEY AND MARKING SCHEME

NOTE: Give key for objective type, complete expected answer for Very Short and Short answer questions and outline answer for Essay (long answer) questions.

Q.No.	VALUE POINTS/KEY	VALUE POINTS WISE MARKS	TOTAL MARKS

QUESTION-WISE ANALYSIS

Subject________________ Unit____________________

Class________________ Maximum marks________________

Q.No.	Objective.	Specification	Content Sub-Unit number	Form of questions	Marks allotted.	Appr x time

APPENDIX-C

LIST OF INSTRUCTIONAL OBJECTIVES OF SCIENCE

1.0 KNOWLEDGE

The pupil ACQUIRES KNOWLEDGE of technical terms; facts procedures, processes, concepts, principles and themes

Expected Learning outcomes (SPECIFICATION)

1.1 recalls Scientific facts, concepts, principles etc.

1.2 recognises Scientific apparatus, specimens, facts etc.

2.0 UNDERSTANDING

The pupil DEVELOPS UNDERSTANDING of terms, facts concepts, principles etc. related to science.

Expected Learning Outcomes (SPECIFICATIONS)

2.1 translates Scientific terms, symbols, formulae, data, etc. from one form to another.

2.2 Cites illustrations of scientific principles, concepts, phenomena, etc.

2.3 Identifies relationship between various concepts processes, etc. related to science.

2.4 detects errors in experiments, processes, statements, etc. related to science.

2.5 compares scientific terms, concepts, principles etc.

2.6. classifies specimens, facts, concepts, etc.

2.7 interprets concepts, data, graphs, etc.

[illegible] explains concepts, principles, processes etc.

3.0 APPLICATION

The pupil APPLIES knowledge and understanding of science in unfamiliar situations.

Expected Learning outcomes (SPECIFICATIONS)

3.1 Analyses the given data or observed scientific facts and phenomenons to identify different components.

3.2 formulates hypothesis on the basis of given data or observed facts and phenomena.

3.3 suggests appropriate and alternative experimental procedures for a given purpose.

3.4 gives reason for certain causes and effects in in scientific phenomena.

3.5 draws conclusions from the given data

3.6 generalises on the basis of the observations or given data.

3.7 predicts scientific phenomena from the observed facts or given data.

3.8 judges the relevance, adequacy and consistency of scientific concepts and principles in the given data, experimental procedures and other scientific phenomena.

4.0 SKILLS

The pupil develops SKILL in

4.10 drawing diagrams, charts, graphs, sketches, etc. pertaining to science.

4.20 manipulation apparatus and instruments.

4.30 collecting, mounting and preserving specimens.

4.40 observing scientific specimens, phenomena structures, etc.

4.50 reporting information, evidence and results, using scientific terminology.

Expected learning outcomes (SPECIFICATIONS)

4.10 DRAWING SKILLS :

4.11 draws diagrams, charts, etc. of observed or given specimens, material, apparatus and instruments faithfully.

4.12 completes the incomplete diagrams correctly.

4.13 recognises the various structures in the sketches, and diagrams concerned with various functions.

4.14 lables sketches and diagrams methodically and correctly.

4.15 draws sketches and diagrams neatly at a reasonable speed.

4.20 MANIPULATIVE SKILLS

4.21 arranges the apparatus systematically.

4.22 handles the apparatus and instruments carefully.

4.23 reads the instruments and apparatus with precision.

4.24 maintains the apparatus and instruments in order.

4.25 improvises apparatus and models, using locally available materials.

4.30 COLLECTING, MOUNTING AND PRESERVING SKILLS

4.31 locates the right habitat of location for a particular specimen, material etc.

4.32 gathers the required material during the appropriate seasons economically and purposively with permission of his/her teacher.

4.33 handles efficiently the equipment and instrument for collection of specimens, materials etc.

4.34 uses the appropriate materials economically to mount the specimens.

4.35 selects the right preservatives for different specimens.

4.40 OBSERVING SKILLS

4.41 Notices the relevant details in the given specimens and scientific phenomena carefully.

4.42 reads the apparatus and instruments correctly.

4.43 discriminates between closely related structures, parts and specimens accurately.

4.44 locates the desired parts in a dissection or specimen exactly.

4.45 detects errors in experimental set up and procedures.

4.50 REPORTING SKILLS

selects the appropriate scientific terminology in describing specimens and phenomena.

4.52 uses the appropriate terms in proper sequence and right context.

4.53 puts the ideas in clear, precise and unambiguous terms.

4.54 records the evidence or data from various sources faithfully.

4.55 tabulates the data or evidence in appropriate form.

4.56 presents the scientific information in a logical order.

4.57 summarises the data and evidences in accordance with the desired pattern.

5.0 APPRECIATION

The pupil APPRECIATES the scientific phenomena in nature and the role of science in human welfare.

Expected Learning Outcomes (SPECIFICATIONS)

5.1 recognises the unity of life in diversity of forms.

5.2 signifies the interrelationships among various types of organisms.

5.3 develops insight into the means and methods of science used for exploiting nature and utilising natural resources for human welfare.

5.4 interprets the role of tools and techniques of science in the development of science.

5.5 realises the struggle for existence among living organisms and the role of adaptation for adjustment.

5.6 gets thrilled at the beauty of nature and is convinced of the role of biology in developing aesthetic sense in human beings.

5.7 feels the importance of science as inquiry in exploring the secrets of nature.

5.8 visualises the impact of science on Social behaviour.

6.0 INTEREST

The pupil develops INTEREST in the living and material world.

Expected Learning Outcomes (SPECIFICATIONS)

6.1 enjoys collecting, mounting, preserving and displaying specimens of scientific interest.

6.2 participates voluntarily in science club activities.

6.3 frequently writes articles in school and other magazines related to science.

6.4 visits on his own the botanical gardens, zoos, museums, factories, dams, and other places of scientific interest.

6.5 undertakes hobbies such as improvisation of scientific models, gardening and field-study in his spare time.

6.6 reads regularly the books and journals on the life and works of scientists with pleasure.

7.0 SCIENTIFIC ATTITUDE

The pupil develops SCIENTIFIC ATTITUDE towards natural and physical phenomena.

EXPECTED LEARNING OUTCOMES (SPECIFICATIONS) :

7.1 becomes inquisitive about the biological phenomena.

7.2 is open minded in accepting others' view points.

7.3 believes in cause and effect relationship.

7.4 does not accept things without proof of justificati

7.5 suspends judgement in the absence of adequate evide

7.6 shows perserverence in undertaking biological activities.

7.7 manifests intellectual honesty in reporting results of experiments.

APPENDIX-D.

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